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Devoted to the practical application of dyestuffs in all industries; especially to textile chemistry—the science and practice of scouring, bleaching, dyeing and finishing.

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Rapid Methods for Detecting 'Damage' in Cotton and Wool

By A. J. HALL, B.Sc., F.I.C., F.T.I.

Specially Contributed

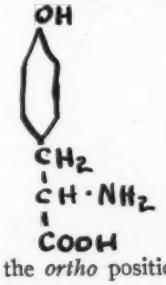
Cotton and wool fibers are alike in respect of the fact that they are both protected from weathering and chemical influences by an outer layer. In the case of cotton this layer appears to be a continuous cuticle of highly resistant cellulose, while with wool the protective layer consists of overlapping epithelial scales. Rupture of the cellulose cuticle or the removal of the epithelial scales by mechanical or bacterial influences at once reduces the strength of the fiber and renders it more susceptible to attack and deterioration during the various wet processes involved in scouring, dyeing, and finishing. It is therefore of considerable importance to have available means for detecting "damage" in wool and cotton fibers.

BECAUSE wool is a nitrogenous fiber and thus has chemical properties entirely different from those of cotton it is obvious that the tests available for the one fiber are not generally applicable to the other. Yet with both fibers, damaged parts can be detected by their greater reactivity towards chemical or swelling agents as compared with the remainder of the fiber protected by the cuticle or scales.

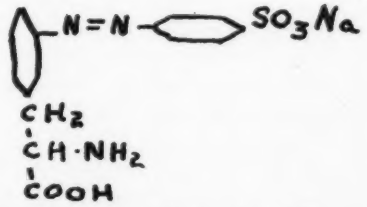
Recently special attention has been given to the detection of damage in wool, and previous methods have been much improved and extended. It may be noted that of the early methods of testing two were of special significance. The first, that of Pauly and Binz (Zeit. fur Farben und Textil Ind., 1904, *3*, 373), utilized the fact that the portions of the wool fiber below the epithelial scales are capable of coupling with diazotized sulphanilic acid with the formation of a reddish brown color; this formation of color can only take place where the scales have been disturbed sufficiently to allow the diazo solution to penetrate and thus react. The second method is that of Becke (Farber-Zeit., 1912, *23*, 45 and 66) who used the Biuret reaction, and also the fact that wool attacked by alkali afterwards gives a brownish coloration when warmed with a solution of stannous chloride due to the formation of stannous sulphide.

The Becke method has not been developed to so great an extent as the Pauly method and in the hands of C. Rimington and R. Burgess this latter method has been modified so as to be of the greatest assistance in the examination of damaged wool. A further useful test is that of W. Sieber (Textilber., 1929, *9* 326) in which use is made of the special dyeing properties of damaged wool.

Turning to the Pauly test it may at once be remarked that the color formation with diazotized sulphanilic acid is due to coupling of this amine with the tyrosine present in wool. This substance is a complex phenol having the following formula



and is capable of coupling in the *ortho* position yielding the following colored substance:



Histidine is also present in wool, and Burgess and Rimington (Journ. Roy. Microscop. Soc., 1929, *49*, 341) have shown that this is also involved in the color formation with diazotized sulphanilic acid. There is this difference, however, between tyrosine and histidine; the color given by tyrosine is unstable while that with histidine is stable.

At the present time it is not known definitely whether or not tyrosine is present in the epithelial scales of wool. If it is present then it is probably in complex combination such as to render it non-reactive with diazotized sulphanilic acid.

The Pauly reagent was formerly prepared by thoroughly mixing in a test-tube 2 grams of sulphanilic acid, 3 c.c. of water, and 2 c.c. of concentrated hydrochloric acid, and then carefully adding 1 gram of sodium nitrite dissolved in 2 c.c. of water. The diazo compound (insoluble in water) was then filtered off at the pump, and after washing with a small quantity of water, was dissolved by pouring over it a small amount of a 10 per cent solution of sodium carbonate. On treating wool with the resulting alkaline diazo solution it is observed that a reddish brown color develops in those parts where the epithelial scales have been removed or disturbed; the depth of color produced is a measure of the extent of the disturbance or damage. Owing to instability of the Pauly solution it should be employed immediately after preparation.

Using the above described method as a basis, Rimington (J. Text. Inst., 1930, *21*, 238) has extended it so that it can be used for quantitative determination of the damage in wool. Briefly, the modification of the original method consists of allowing the color formation in the wool to proceed under standard conditions and then dissolving out the color with a solution of caustic soda and comparing the intensity of the resulting color solution with a standard solution prepared with a dyestuff. The following are the essential details for carrying out the test:

The reagent itself is obtained by mixing 10 c.c. of a 10 per cent solution of sodium sulphanilate with 5 c.c. of a 8 per cent solution of sodium nitrite then adding 2 c.c. of concentrated hydrochloric acid down the side of the vessel, mixing with a gentle motion and allowing to stand for one minute before use.

In the test, a suitable quantity of wool (0.1 gram is convenient) is first wetted out in 15 c.c. of 9 per cent sodium carbonate solution and to this the reagent prepared as above is added. After exactly 10 minutes the wool is withdrawn, rinsed thoroughly in water, and transferred to a test-tube. Then 4 c.c. of 10 per cent caustic soda solution is added, the tube placed in a bath of boiling water for exactly five minutes, and the resulting reddish solution transferred quantitatively to a graduated flask and made up to a convenient but definite volume.

The weight of wool taken and the volume of the final solution must depend on the extent of the damage; a convenient volume may range from 5 to 25 c.c. according to the depth of color.

For the purpose of establishing a scale of damage Rimington assigns a damage index of 100 degrees to a wool such that 0.1 gram treated as above yields a color extract (diluted to 25 c.c.) having the same intensity of color as a 0.1 per cent solution of New Acid Brown S (B.D.C.). Thus the degree of damage in any sample of wool is determined by comparing colorimetrically the colored extract with a 0.1 per cent solution of this brown dye and then making the necessary calculations. It is fortunate as regards this colorimetric determination that the intensity of the color of the wool extract decreases regularly with dilution; this is also true of New Acid Brown S. Another important fact established by Rimington is that the color of the wool extract is stable; fading is inappreciable even after standing for six hours.

There is just one point of importance as regards the duration of the period for treating the damaged wool with the diazotized sulphanilic acid solution. It is noticed that shortly after immersion of the wool in the test solution the damaged parts become definitely colored, but with prolongation of the contact the test solution diffuses into the wool substance around the points of damage and thus produces an extended coloration which is not due exactly to damage. Thus if the contact be prolonged, too much, the amount of color formed is not an accurate measure of the extent of the damage in the wool. For this reason the period of ten minutes is allowed in the test since it is believed that this is sufficient to allow full coloring of the damaged parts to take place without serious simultaneous diffusive coloring.

Before the above described work of Rimington was published Sieber (Textilber., 1928, *7*, 326) pointed out the instability of the Pauly reagent and discovered an alternative test free from this disadvantage in which the coloring reagent consisted of a 1 per cent solution of Cotton Red 10B (Benzopurpurine 10 B). In the first place Sieber, following the Pauly procedure, attempted to replace the solution of diazotized sulphanilic acid with one containing diazotized Benzopurpurine 10 B (this dye contains free amino groups capable of diazotization) and in this manner was able to color the damaged wool in bluish red shades. Afterwards he found that it was unnecessary to diazotize the dye; it could be used in its normal state.

In carrying out the Sieber test a small qunatity of the wool (raw wool is first degreased by washing with ether, and then with water) is boiled for a few minutes in a 1 per cent solution of the Benzorpurpurine 10 B, then further boiled with water until no color is extracted; the fibers are then examined under the microscope. It is found that the wool is stained red in those parts damaged mechanically (for example, at the cut ends), and it is also stained throughout where damaged by the action of an alkali or acid. If wool is warmed for ¼ to ½ hour at 50 to 60° C. with a 5 per cent solution of sodium carbonate, and then thoroughly freed from alkali by washing, it becomes uniformly stained a pale rose to red in the Sieber test. If the wool is damaged by impregnation with 5 per cent sulphuric acid solution followed by heating at 80° C. for one hour, then the resulting stain produced by the test is bluer. This difference between the behavior of wools damaged by acid and alkaline treatments persists even

(Continued on page 139)

Proceedings of the American Association of Textile Chemists and Colorists

The American Association of Textile Chemists and Colorists

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Joseph Pizzuto, Chairman; Raymond Matthews, Secretary.

North Carolina State College Junior Section—
R. A. Gilliam, Chairman; D. B. Hardin, Secretary.

CALENDAR OF COMING EVENTS

Meeting Northern New England Section, March 5th.

* * *

Meeting Mid-West Section, February 27th.

* * *

Meeting New York Section, February 26th.

SEVENTY-EIGHTH COUNCIL MEETING

THE Seventy-Eighth Council Meeting of the American Association of Textile Chemists and Colorists was held at the Chemists' Club, New York, N. Y., January 22, 1932, at 1:45 P.M.

The following were present:

President: P. J. Wood.

Vice-President: Wm. H. Cady.

Councillors: Wm. R. Moorhouse, Ralph Culver, Walter M. Scott.

Councillors ex-officio: Robert H. Gaede, Chairman, New York Section. Prof. L. A. Olney, Chairman, Research Committee.

Secretary: A. Newton Graves.

Letters from Treasurer H. R. Davies and R. S. Wheeler, Chairman, South Central Section expressing regrets at inability to attend were read.

The report of the last meeting was read and approved.

The Assistant Secretary's balance sheet was read as follows and approved:

	January 20, 1932
Cash on Hand Dec. 1, 1931	$184.30
Receipts Dec. 2, 1931 to Jan. 19, 1932 incl.	
Applications, 16 @ $5.00	80.00
1932 Dues, 336 @ $5.00	1,680.00
1933 Dues	4.91
Corporate Dues	1,475.00
Annual Meeting Registration	327.00
Launderometer Royalties	77.00
Year Book Sales, 2 @ $2.00	4.00
Year Book Sales, 3 @ $3.00	9.00
Light Fastness Report Sale	1.00
Pin Sales, 5 @ $1.50	7.50
1 Reporter Sale	.50
	$3,850,21

Disbursements:

Dec. 1, 1931, Exchange charges.....	$ .40
Dec. 14, 1931, Exchange charges.....	.98
Dec. 17, 1931, To Treasurer Research Fund.	1,125.00
Dec. 17, 1931, To Treasurer General Fund..	1,400.00
Dec. 29, 1931, Exchange charges.....	.50
Dec. 19, 1931, Returned check—Bank closed.	5.00
Jan. 18, 1932, To Treasurer Research Fund.	325.00
Jan. 18, 1932, To Treasurer General Fund..	400.00
Cash on Hand Andover National Bank.....	593.33
	$3,850.21

The following were elected to membership as of thirty days after the publication of their names provided no objections to any are received by the Secretary:

Active:

Bell, Edward B.—64 Humphrey St., Lowell, Mass. Overseer of Dyeing, Malden Spinning and Dyeing Co., Commercial St., Malden, Mass.

Bryant, Joseph Allen—221 Highland, West Newton, Mass. Vice-President, Arnold, Hoffman Co., 88 Broad St., Boston, Mass.

Iandoli, Louis—76 East 18th St., Paterson, N. J. Dyer, Commercial Piece Dye Works, 79 Matlock St., Paterson, N. J.

Johnson, Edward F.—54 Railroad St., Slatersville, R. I. Asst. Dyer, Slatersville Finishing Co., Slatersville, R. I.

Mueller, Carl—562 Canterbury St., Woodstock, Ontario, Canada. Chemist and dyer, Harvey Knitting Co., Ltd., and Hosiers, Ltd., Woodstock, Ontario.

Oechslin, Lewis Albert—1859 East Clarence St., Phila., Pa. Dyer, Hoffner Silk Dyeing Co.. Howard and Huntington Sts., Phila., Pa.

O'Heir, Thomas F.—38 Arthur St., Maynard, Mass. Dyer, Assabet Mills, Maynard, Mass.

Osborne, D. B.—39 Live Oak St., Sumter, S. C. Superintendent, London Mills, Sumter, S. C.

Junior:

Derby, Joseph C.—111 Olive Ave., Lawrence, Mass. Chemist, American Woolen Co., Shawsheen Village, Andover, Mass.

Ford, Stephen K.—94 Emerson St., Haverhill, Mass. Chemist, Textile Division, Marden-Wild Corp., 500 Columbia St., Somerville, Mass.

McMahon, Clarence—169 Mallory Ave., Elgin, Ill. Boss Dyer, Collingbourne Mills, Inc., Bluff City Blvd., Elgin, Ill.

Associate:

Doane, Norman D.—District Sales Manager, The Permutit Co., 1316 Greenwood Cliff, Charlotte, N. C.

Goller, Harold P.—16 West Stone Ave., Greenville, S. C. Salesman, Neutrasol Products Corp., 39 Cornelisen Ave., Jersey City, N. J.

Goullaud, Eric G.—35 Stetson St., Brookline, Mass. Dyestuff Salesman, Geigy Co., Inc., 88 Broad St., Boston, Mass.

Weller, John Frederick—15 Verndale Ave., Providence, R. I. Representative of Royce Chemical Co., 25 Fountain St., Providence, R. I.

The President appointed the two Vice-Presidents and the Secretary as a nominating committee to act upon applications for membership in the association.

The result of the recent letter Ballot concerning changes and amendments in the constitution was as follows:

484 votes "Yes".
6 votes "No".

The matter was voted closed.

Wm. H. Cady pointed out a mistake in the boundaries as outlined in the Dec. 7, 1931 issue of the AMERICAN DYESTUFF REPORTER. Professor Olney was asked to correct the error.

Walter M. Scott brought up the subject of our joining the Inter-Society Color Council. He will report on this at a later date.

Professor Olney spoke of the use of title-names in the year book. It was suggested that a letter be sent to the members asking them to give full information with regard to their titles.

Professor Olney talked about the Finance Committee. Dr. Killheffer's name was added to this Committee and he was made Chairman.

It was decided that a list of the Research Associates would be published in the year book.

Dr. Killheffer discussed the U. S. Institute for Textile Research with relation to the American Association of Textile Chemists and Colorists.

The Calendar of Dates was discussed. After a motion made it was voted to hold the following Council and Research Committee meetings:

March 11, 1932 in Providence, R. I.
April 1, 1932 in Washington, D. C.
April 29, 1932 in New York, N. Y.
June 3, 1932 in Boston, Mass.

The meeting adjourned at 3:00 P.M.

Respectfully submitted,
A. NEWTON GRAVES, *Secretary.*

SEVENTY-FIRST MEETING OF THE RESEARCH COMMITTEE

THE Seventy-first Meeting of the Research Committee of the American Association of Textile Chemists and Colorists was held at the Chemists' Club, New York, N. Y., January 22, 1932.

The following were present:—

Chairman, L. A. Olney
Wm. D. Appel
Wm. H. Cady
Ralph F. Culver

Dr. Carl Z. Draves
Robert H. Gaede
Walter E. Hadley
Dr. Jos. F. X. Harold
B. L. Hathorne
Dr. E. H. Killheffer
Wm. R. Moorhouse
Dr. Hans Meyer
Dr. D. H. Powers
Dr. Robert E. Rose
Walter M. Scott
P. J. Wood

Secretary, A. Newton Graves

The Chairman reported that the Textile Foundation had voted to continue the allocation of $5,000 for another year to assist in the work of the Research Committee. Several letters received from and written to Mr. Franklin W. Hobbs, Chairman of the Trustees of the Textile Foundation were read and the chairman stated that he was to have another interview with Mr. Hobbs in regard to an additional allotment. The work of the recently appointed sub-committee on Research Program was discussed and the chairman, Donald H. Powers, reported in regard to a meeting of this sub-committee which had been held earlier in the day.

The make-up of two new sub-committees was discussed by the Chairman. The names of these sub-committees will be Sub-Committee on Methods of Analysis and Standardization of Sulphonated Oils and Sub-Committee on Standard Methods of Chemical Analysis and Testing as Applied to the Chemical Industry. These sub-committees will be made up and reported on at a later date.

The meeting adjourned at 4:30 P. M.

Respectfully submitted,

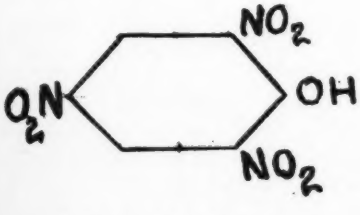
A. Newton Graves,
Secretary.

The History of Dyestuffs*

By **DR. R. E. ROSE**

Director, Technical Laboratory, E. I. du Pont de Nemours & Co.

THE first artificial dyestuff was made by accident. It was obtained by the oxidation with nitric acid of indigo. This was done by Wolfe in 1771 and he found that the product he obtained, picric acid, dyed silk and wool a yellow shade.



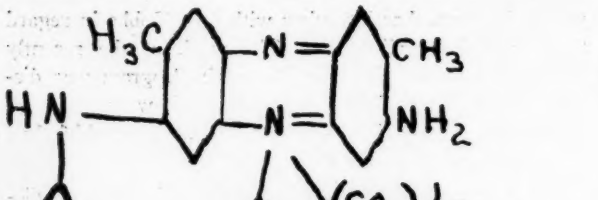
Picric Acid

A little later the science of organic chemistry was developed with very great rapidity. Every university had on its faculty men who were pushing the science into new ground. Among the most brilliant organic chemists was Adolph Von Hofmann, a German, who resided at that time in England, where he was engaged in teaching. It was he who first investigated organic bases and was able to show that they might all be considered as derived from ammonia. It was because of this purely academic research that commercial artificial dyes were discovered. One of Hofmann's students was William Perkin. He was interested in the possibility of making quinin from anilin, an idea that came to him from his contact with Hofmann. Both these substances being basic and one differing from the other in containing oxygen, Perkin hoped to convert anilin into the compound containing oxygen, quinin, by oxidation. He proceeded to experiment and allowed bichromate of potash to act upon anilin. He did not obtain the alkaloid he was looking for but he did discover mauve, the first anilin dye. The composition of this dyestuff is shown in the formula.

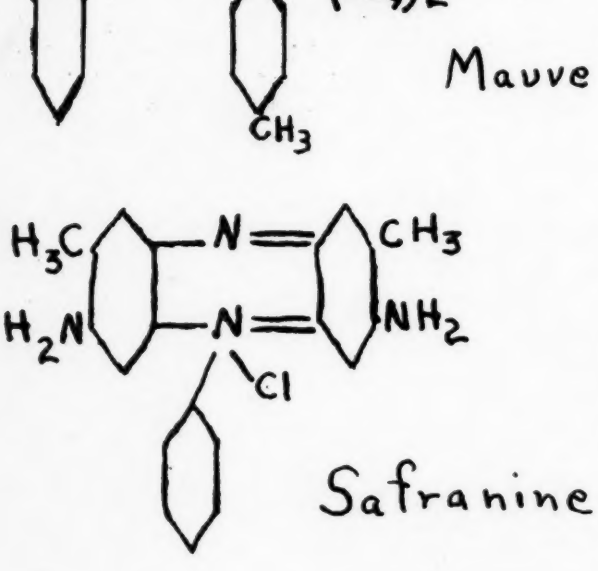
It is remarkable that if Perkin had used pure anilin instead of a product that was two-thirds toluidine, he would not have made his discovery. Fortunately for the industry Perkin had a very shrewd commercial sense and he proceeded to produce his color and market it. This was in 1856. Very soon afterward Safranine was first made. It is still one of the most important basic colors, being used very largely in the paper trade.

The years that followed were extraordinarily successful

* Presented at November Meeting, Rhode Island Section.

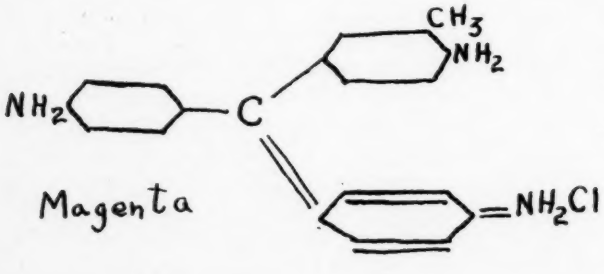


Mauve

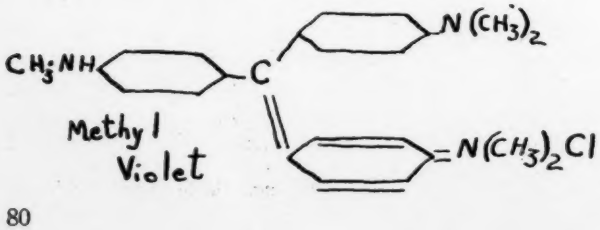


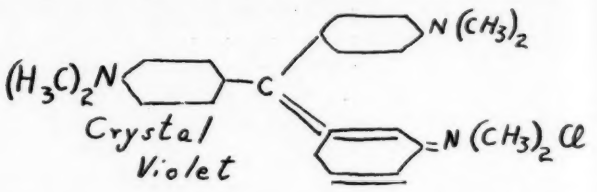
Safranine

in producing new color bodies from organic substances. In 1859 magenta was discovered. Its name was given it

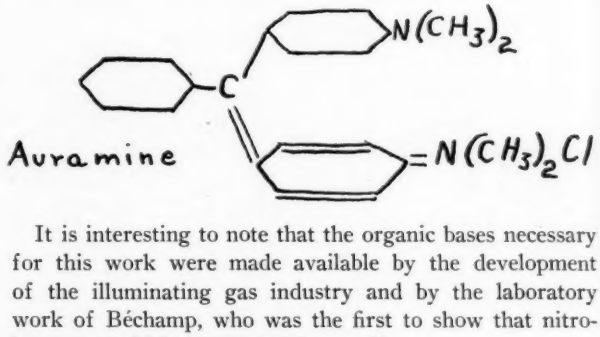


to celebrate the victory of the Austrians over the Italians in that year. In 1861 the French opened up the field of the basic violets—methyl violet and crystal violet



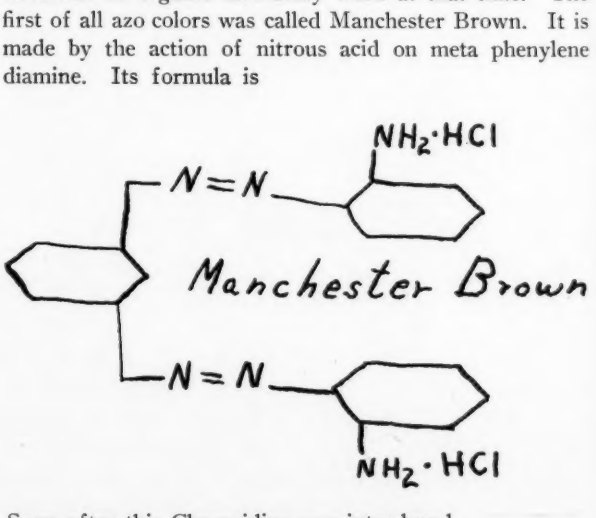


Then came malachite green, followed a good deal later by auramine, which is still extremely important, though it is very fugitive.



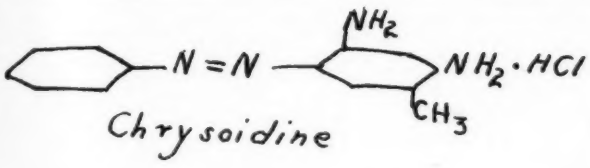
It is interesting to note that the organic bases necessary for this work were made available by the development of the illuminating gas industry and by the laboratory work of Béchamp, who was the first to show that nitrobenzene could be converted into anilin.

Probably the next most fundamental discovery was the outcome of the work of Peter Griess, who was a very ardent organic chemist employed in a brewery. It was his spare time that he dedicated to the research that gave rise to the great series of colors we call azo dyestuffs. Griess was a marvelous experimenter, he studied the diazo reaction, isolated and analyzed the compounds formed, some of them extremely explosive, and did so with a certainty that is surprising when one considers the primitive condition of organic laboratory work at that time. The first of all azo colors was called Manchester Brown. It is made by the action of nitrous acid on meta phenylene diamine. Its formula is



Soon after this Chrysoidine was introduced.

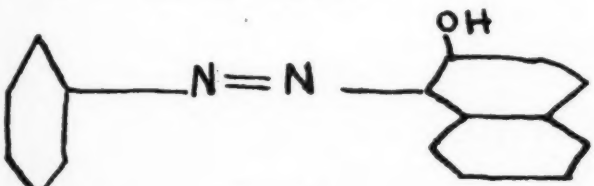
Both of these azo colors belong in the series of basic dyes.



Chrysoidine

It is interesting to know that the firm who put Chrysoidine out was so sure that no one could find how it was made that they decided not to protect themselves by securing a patent. Actually in a scientific paper, published a few months later Hofmann demonstrated quite clearly that it was made from anilin and meta phenylene diamine. It was this incident more than any other that emphasized the value of patents in this extremely competitive field.

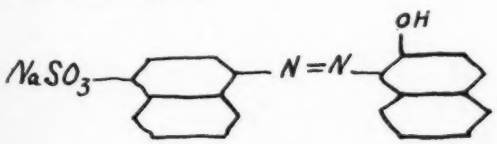
In November, 1876, the firm of Poirrier in St. Denis put out a set of orange colors which were very brilliant and different from the artificial colors which had been made previously in that they were sulphonic acids, that is, the colored part of the molecule itself was acid and not basic as in the case of the anilin colors. These very excellent acid colors caused a great deal of excitement. Orange II is still very largely used.



Orange II

It is made from sulfanilic acid and beta naphthol. Note that the chemical advance was in converting anilin or other aromatic bases into sulphonic acids which are water-soluble.

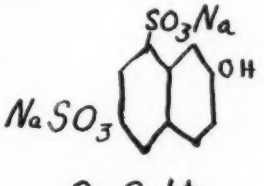
The year 1878 saw the introduction of a very good acid azo red, Fast Red A.



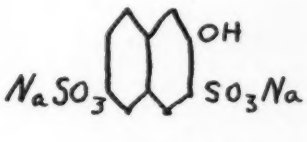
Fast Red A

It was then that the real struggle between natural and artificial colors began. The only conflict between the two types of colors before, was in 1869 when artificial alizarin took the place of the natural product with which it was chemically identical. This new development was the substitution of azo colors differing entirely in structure from natural colors of the same shade.

Acid colors were soon produced in great abundance but they were most of them reds or oranges. In this connection the organic chemist found that naphthalene sulphonic acids had a characteristic that he had not anticipated. In the naphthalene molecule it is possible to introduce the sulphonic acid group in a number of positions, if there is already a substituent present. At first it was thought that the sulphonic acid group had nothing to do with coloration but it was found that its position made a difference in the hue of the azo color into which the molecule was incorporated. The formulas given are those of G and R salt:



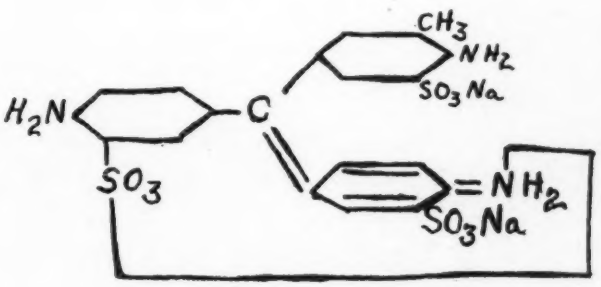
G Salt



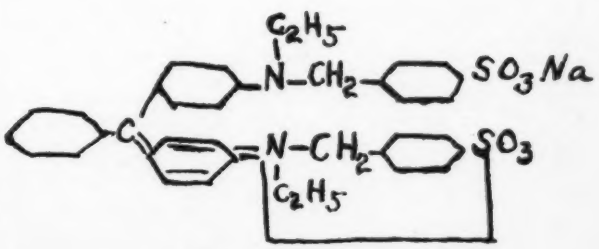
R Salt

The R salt coupled with beta naphthol gives a very much bluer red than does G salt. Owing to this the isomerism of the sulphonic acid became of primary importance to the dyestuff manufacturer.

The acid colors suffered at first from the fact that the line contained no greens or blues. This objection was overcome by converting special types of basic colors into acid colors by sulphonation, direct or indirect. The following are typical acid tri-phenyl-methane dyes:

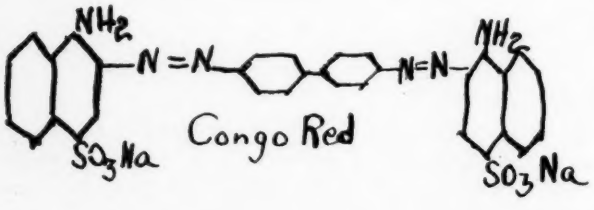


Acid Magenta

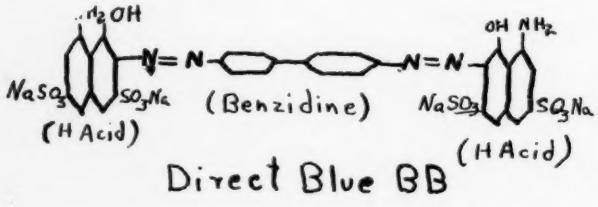


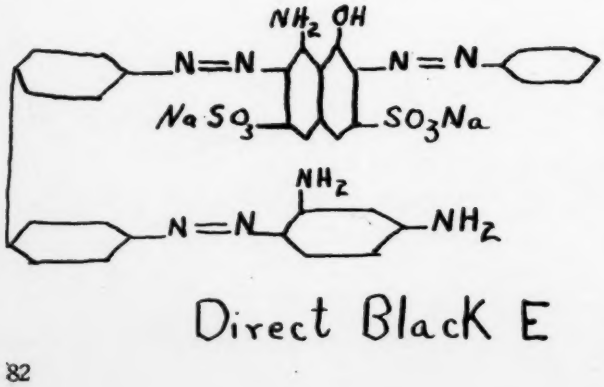
Guinea Green B

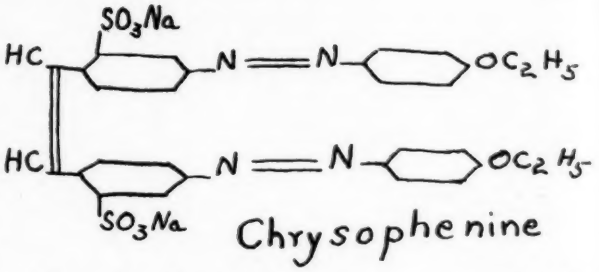
In 1884 came the next extremely important step forward. It was based on work done in the research laboratory on the production of anilin from nitro-benzene. It had been found that if this reduction was carried out in an alkaline medium two molecules of nitro-benzene unite with the loss of all their oxygen, giving hydrazo benzene. Hydrazo benzene in the presence of acid and anilin hydrochloride is converted into benzidin. Benzidin itself is a colorless, very feebly basic organic substance. It can be diazotized and tetrazotized and coupled with naphthalamine and naphthol sulphonic acids. Dyestuffs are produced having the property of dyeing cotton directly. The first of these was made by Boettiger in 1884, who coupled benzidin with naphthonic acid and thus obtained Congo Red.



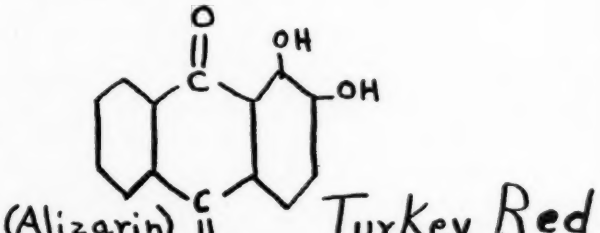
The group of substantive colors was very rapidly extended. It was found possible to make blues and reds, violets, browns and yellows, though the last were not made from benzidin but from para-amino-stilbene-di-sulphonic acid. In 1896 a good direct black was produced which is still the most important in point of output of any of the direct colors.



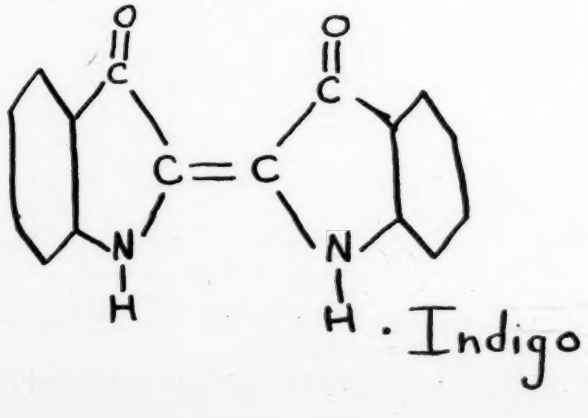


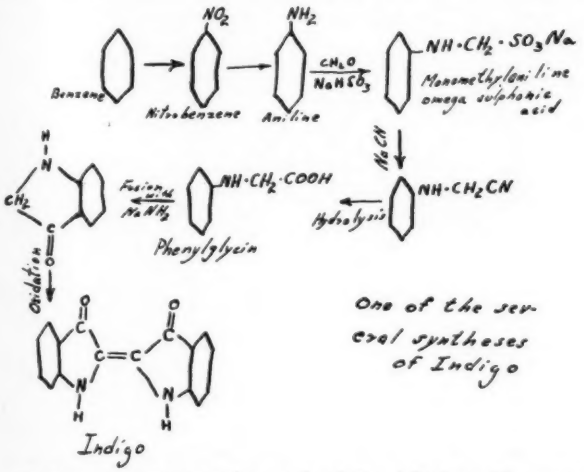


Of all the natural colors known none was more highly rated than Turkey red. Its fastness was enough to meet every requirement. Comparatively early in the study of organic chemistry this compound was investigated by Karl Graebe and Liebermann. They found that alizarin, the aluminum lake of which is Turkey red, could be converted easily into anthracene and with this information they determined its constitution as being 1.2 di-hydroxy-anthraquinone. Knowing this they were able to convert anthracene, available in coal tar, into alizarin, and this was the first case of the chemist making a dyestuff which already occurred naturally.



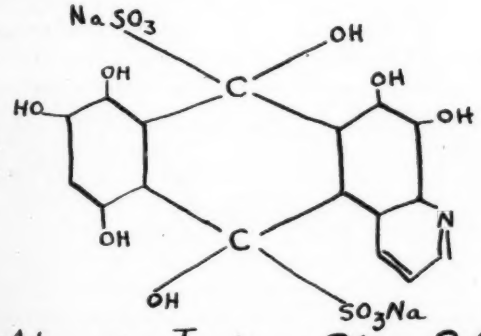
Bayer in Munich studied the constitution of indigo. It took him 20 years to find out how the atoms were united in the molecule, and it is to his 20 years of research that we owe the fact that indigo sells for less than 20 cents today. In this case it was not so easy to go from the laboratory to the plant and it was only when sodamide was used in the process that it became commercially feasible.



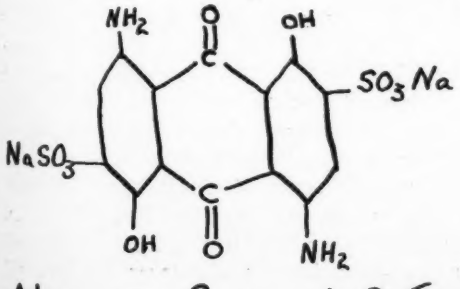


One of the several syntheses of Indigo

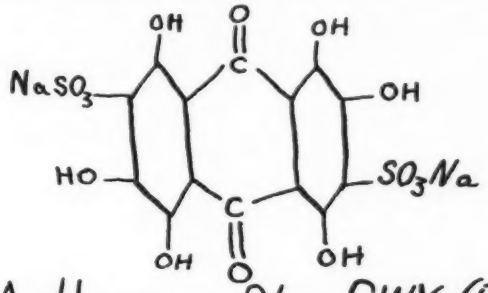
Let me now turn to the work of René Bohn. He was a Swiss. He devoted himself to organic chemistry, more particularly to dyestuffs, and entered the laboratory of the Badische Anilin und Sodafabrik. It is a curious coincidence that he had a close friend, also a Swiss, who took the same course but entered the laboratory of the Bayer Company, at that time competing strongly with the firm employing Bohn. Both of these chemists devoted themselves to the problem of producing dyestuffs from anthraquinone. Bohn succeeded in making some very excellent chrome mordant colors. Schmidt produced a whole series of acid anthraquinone dyes, some of which have never yet been improved upon.



Alizarin Indigo Blue S (Bohn)

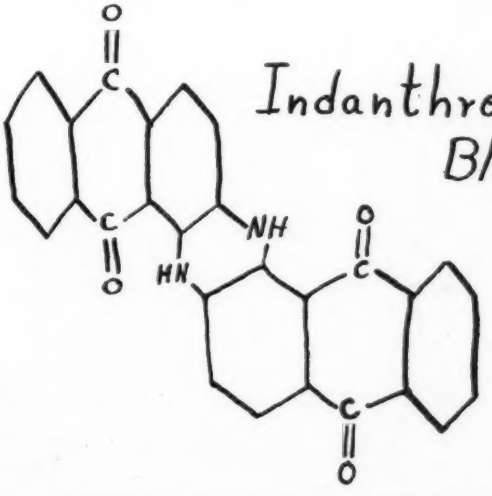


Alizarin Saphirol B (Schmidt)



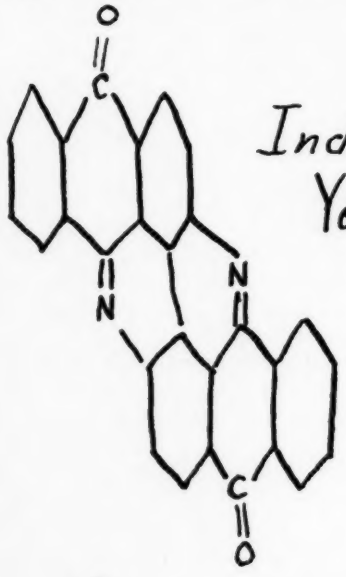
Anthracene Blue SWX (Bohn)

Bohn's insatiable desire to produce new organic combinations led him to endeavor to produce from anthraquinone something analogous to indigo. He started with beta-amino-anthraquinone and by fusing this with sodium hydroxide produced a blue product which could be dyed after reduction very much as indigo is dyed. This was the first of the great series of vat colors, the Indanthrenes. It would take us too far, to consider the chemistry of this group, to study in detail the achievements of the organic chemist in building highly complex molecules to fit a particular purpose. As dyers you will appreciate that Bohn had to do a great deal more than produce a new line of colors. He had to work out the methods of their application with the help of the group about him. This involved the commercial manufacturer of hydrosulphite, the sulphoxylates and similar products.

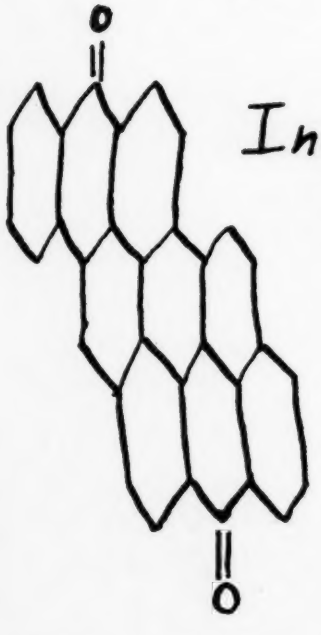


Indanthrene Blue R

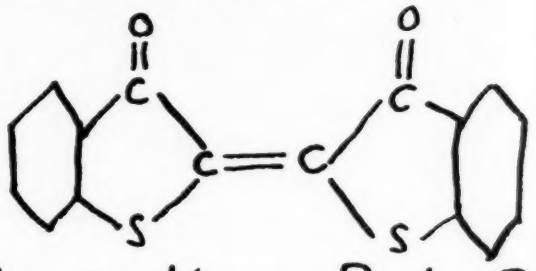
An important development in dyestuff chemistry has come of the work of Friedländer. It was he who built a molecule similar to that of indigo, except that it contained an atom of sulphur in the place of the NH group. This compound could be dyed like indigo but was a very blue red. It was the first of the thio-indigo dyes. Since then a great many have been produced, some as fast as the anthraquinone vat colors and others not quite so fast, but still much better than any direct colors.



Indanthrene Yellow G



Indanthrene Violet R



Thioindigo Red B

In very recent past the chemist has found it possible to convert vat dyestuffs into water-soluble derivatives. These colors, the Indigosols and Soledons, are to all intents and purposes acid colors derived from the leuco compounds of the underlying vat colors. When oxidized they revert to the parent molecule. For certain purposes these colors suffer from the fact that their affinity for cotton is lower than that of the underlying leuco compound. On the other hand, they can be used on wool without damaging the fiber by alkali.

You mustn't assume that the dyestuff chemist is standing still, feeling that his work is accomplished. I need only refer to the group of Neolan colors introduced in the last few years to emphasize the truth of my statement. In these, advantage is taken of the fact that azo dyestuffs containing a hydroxyl group in the ortho position to the azo group form chromium compounds. Upon these depends the value of most chrome colors. In the Neolan colors the chromium is already associated within the dyestuff molecule and all that is necessary is contact with the fiber in an acid bath at or near the boil to produce the lake. These colors are extremely interesting from the chemist's point of view.

We have not the time to consider another group in which the chemist has made clear that he is not standing still. He has developed new azoic colors which depend on the use of the analid of beta hydroxy naphthoic acid or similar naphthols coupled with diazotized bases to give insoluble brilliant fast dyes. This group is still being improved by the introduction of products which save the dyer the trouble of carrying out the diazotization himself.

You may have noticed that I have said nothing about the great group of sulphur colors. There is a reason for my reticence and that is that the chemist knows nothing about the actual molecules of which sulphur colors are composed. The very first member of the series was made by heating up organic matter (shavings and the like) with sodium sulphide, obviously not a method lending itself to careful control. Later on pure materials were used instead of mixed organic matter but the reactions remained obscure.

In closing let me emphasize again how very short is the period covered by the whole history of dyestuff chemistry. There are in the room those who probably saw the coming of the first direct colors. It is a remarkable example of the rapid development that comes when chemistry is studied for its own sake in the scientific laboratory, while the field studied relates directly to an important commercial use of the compounds in question. The tools that the dyers and colorists use, most of them, originated in the brains of organic chemists who never put dyestuff on fiber.

Proceedings of the American Association of Textile Chemists and Colorists

Some Commercial Aspects of the Textile Industry*

By **F. S. WILSON**
Chief, Business Research Section, Marketing Service Division, U. S. Dept. of Commerce

I HAVE no means of knowing why a discussion of the commercial aspects of the textile industry appears on the program of an association of this kind, which I understand is composed entirely of technical men. It is interesting to me because it is so indicative of what is going on today in industry. The right hand wants to know what the left hand is doing. The manufacturer is now abandoning his traditional policy of letting wholesale and retail distribution and consumer demand take care of themselves and he not only wants to know what it is all about but he wants to take a hand in it.

A hunter who had returned from a deer hunting trip to Maine was regaling a friend with an account of the size of the deer. He said, "Their antlers are eight feet across. And you should see those Maine woods. The trees grow so thick a man can't walk between them."

"Wait a minute," remarked his friend, "You say the deer have antlers eight feet across and the trees grow so thick a man can't walk between them. I'd like to know how the deer get through those woods."

The story teller, without a moment's hesitation remarked, "So would I, but that's the deer's lookout, not mine."

The manufacturer used to leave the wholesaler and retailer, with their wide inventories, to get through the distribution woods as best they could; now he knows that if goods are not sold to the customer he cannot stay in business. The problems of the mill owner, colorists and chemists are not sharply divided from those of the distributor. Both are subject to the whims of King Consumer. Distribution is not a process that begins when a bolt of cloth is placed on the jobber's or retailer's shelf. It starts before the looms begin to work. As you know the Lowell Textile Institute has added a course in marketing on the theory that a production man is better equipped if he knows where his product is going and how, and to whom it is to be sold.

In the Department of Commerce we have reduced the defects of distribution to two fundamentals: (1) faulty knowledge of markets, (2) faulty knowledge of costs. Let us examine these defects one at a time. When we speak of markets, we include all the machinery of wholesale and retail distribution, and we include that intangible and unmeasurable thing called consumer demand. What is style? It is nothing but what the consumer demands. What is a popular color? Nothing but the color the consumer demands.

Only a few years ago a towel was only a towel. Now it is an ornament. I remember when I entered Dartmouth College as a freshman. In my equipment were some linen face towels, of such durable quality that I still have some of them. They were bought for me by my mother because she is a good judge of quality in linen. According to the consumer preferences of that time, those towels left nothing to be desired, although they were severely plain and devoid of color or patterns. However, I dare say that a freshman entering your state university at Chapel Hill this fall inclined towards colored borders, stenciled designs, and the figures of ships, animals, fraternity insignia, and what not. If the evolution of towels keeps up we'll be sealing them up in the cornerstones of new buildings, along with the newspaper and coins, as an infallible reflector of the times and customs.

We could discuss styles here all night and not be any nearer to understanding what is it. Why do people nowadays want sheets and pillow cases in colors? Why will a housewife buy a bedspread or a baby blanket that is packaged in an attractive box with part of the article exposed, more quickly than she would buy the identical article lying on a counter unpackaged? Why do we want our refrigerators, bathtubs, kitchen utensils, magazine racks, automobiles, etc., in colors? That is the style; we're all doing it and yet we don't know why we started. Who sets these styles?

In 1763 the opera in Paris burned down. "Burnt opera house" immediately became a popular flame color. The archeological expeditions into Egypt introduced the shade known as "Egyptian sand." As a result of the excavation of the tomb of Tut-ankh-ahmen we had a vogue of Egyptian designs in furniture, scarfs, jewelry, etc. The colorful career of the Italian patriot Garibaldi inspired "soldferina. Zuloaga, the Spanish painter, started "Spanish Red." Alice Roosevelt started "Alice Blue."

Henry Ford for many years resisted efforts to have him make his famous car look like an automobile. But he couldn't stand the competition of style and he created a car that appealed to modern tastes. The ornamental

*Presented at Annual Meeting, Piedmont Section.

radiator cap, with the figure of a greyhound, an airplane, or a beautiful lady in undress uniform made such an appeal to American motorists that manufacturers of motor meters had to shift their instrument from the radiator to the dashboard. And an example of styling that always stands out in my mind because it is comparatively recent is the new-style electric fan, a utilitarian object which has gone for years without ornamentation and which now has branched out as a worthy bit of decorative art.

They tell us women's styles come from Paris. Perhaps a stylist creates a dress and sells it to a well known society woman. She wears it in public and the style becomes popular. Many such prominent persons, I am told, are followed from one resort to another, from restaurant to race track by stylists who observe what they are wearing. We know what an influence the Prince of Wales has on styles in men's clothes. In this country a great deal of attention is paid to the clothes worn by the famous movie stars in Hollywood.

It is questionable whether these prominent persons actually set the styles. It is probably more accurate to say that they are used to promote the styles which the designers have created. If a designer creates something that he is satisfied will have popular appeal, he proceeds to promote it, much as an advertising man promotes a new product. If he is a good promoter, a new style becomes popular.

Edward Brenays, the well-known publicity man, tells of the devious ways a thing may be promoted. (example).

The life of a style is something else we cannot measure accurately. How long will the Empress Eugenie hat last? I heard one of the most skillful research men in America say that the life of this hat would be much curtailed by the fact that Amos and Andy announced that Ruby Taylor and Madam Queen were wearing them.

All of this discussion of style is related to the heading of "Faulty knowledge of markets" because the consumer, broadly speaking, is the market. We can think of the consumer as an individual, or as a family, or a community. If the individual is important the family is more so, in selling merchandise. Formerly the family had to make a small income go a long way. Wants were comparatively simple and few. Now income comes easier (when business conditions are normal) and it is spent more lavishly, on radios, automobiles, houses, clothes, and what not? Everybody goes to the movies, listens to the radio, and reads magazines. You can't fool a woman on style nowadays just because she lives in the country. Down in the Eastern Kentucky mountains, in the soft coal mining section where things are still wild and wooly, I have seen coal miners' daughters dressed in the heighth of fashion. They would have been entirely at home on Fifth Avenue, New York.

Packaging is another important element in style. Manufacturers of highly advertised toilet preparations and cosmetics, I am told, pay large fees to the artists who design their packages and containers. Shape, size, color and printing have to be combined into a harmonious whole which will make the package stand out on a shelf when it is surrounded by competing items. Even the kitchen scouring powders are being packaged so as to harmonize with the aesthetic modern bathroom.

An observer from the Department of Commerce who is assigned to the St. Louis Drug Survey, noted that out of 17 sales of shaving cream, made in one drug store, 12 were of articles in blue packages. That may have been entirely a coincidence, or it may have been due to some psychological angle of consumer preference. At any rate, the matter is receiving careful study.

In the textile business, packaging is important to retailer and to customer. The retailer wants shorter length bolts, because a 50-yard bolt may prove more than he can sell of one pattern. The manufacturer claims that production costs become excessive when a 50-yard bolt is cut into two 25-yard bolts. Often the retailers profit is left in the remnant which he must sell at a sacrifice.

So much for style. Going back to the topics, "Faulty knowledge of markets" and "Faulty knowledge of costs," let me describe a few of the surveys which the Department of Commerce has made in the interests of a better knowledge of markets and costs. Although these studies deal with commodities outside the textile field, they treat of problems that face your industry also.

All of these surveys have established several important points: *First,* the profit and loss figure of any business is useless and misleading until we break it down and find out which items are profitable and which are unprofitable.

Second, some customers are distinctly unprofitable chiefly because they place very small orders, or expect too much for nothing.

Third: Not all sales territories are profitable.

Fourth: Most manufacturers and distributors have too many varieties, brands, and sizes. The cotton textile industry has recognized the danger of too many sizes by reducing the sizes of fast selvage turkish towels from 74 to 6 in cooperation with the Bureau of Standards of the Department of Commerce. Such simplification means economy in manufacture and causes less waste and confusion in retailing.

A study of a wholesale hardware house showed that a large number of items carried did not return a profit. Several hundred were therefore dropped. By cutting down the number of items, the house was also able to reduce the sources of supply and buy from fewer manufacturers. Then it established the minimum amount that could be sold to a customer profitably and retailers who bought less than $600 worth of hardware a year were

dropped. Out of 1,472 customers, 700 were dropped. Volume of sales immediately decreased but the dollar volume of net profits increased one-third.

The Louisville, Kentucky, Grocery Survey, in which the Department of Commerce survey the retail and wholesale grocery trade of that city, followed by an intensive study of the operations of 26 stores, proved again that a retailer may be blundering along, satisfied with a very small profit, when the profit could be greatly increased if some unprofitable items were dropped. (For example, half of the Louisville business in canned tomatoes, a staple that is used by every family in the country, was unprofitable because the grocers were selling the wrong size.)

A survey of a wholesale paint store revealed that a profit of 32/100 of 1 per cent was being made because a number of unprofitable items were counteracting the profit made by the other items.

In a wholesale dry goods house salesmen were going long distances to sell orders for goods that didn't pay their traveling expenses, and a salesman selling laces would meet, in a distant state, another salesman of the same house selling yard goods or draperies, or some other line, when one salesman could easily have handled all of them.

Another dry goods study, entitled, "Distribution of Dry Goods in the Gulf Southwest," was made as part of a survey of commercial activity in Arkansas, Louisiana, Mississippi, Missouri, Oklahoma, Texas, and part of Tennessee. Personal calls were made on a large number of dry goods merchants in many towns. Some of the facts revealed are indicative of the puzzling situations facing the men who sell textile products.

For example: One jobber stated that 66% of his customers produced only 12% of his sales. Half the time of the entire organization, including salesmen, was spent in securing 10 to 15% of sales.

Car lot purchases used to be rather common. Now car lots are bought only in floor coverings, linoleums, blankets and sweaters.

Most jobbers interviewed carried from 65 to 85% of their inventories in private brands. How does national advertising and trade-marking enter into that picture?

Initial orders for dry goods are placed in New York, St. Louis and Chicago and fill-ins are ordered from local sources. Under such circumstances, how can these local sources estimate their needs accurately enough to avoid waste?

One of the Department's latest studies, of a wholesale electrical goods concern, showed that of 42 commodity groups handled, 22 showed a net profit and 20 showed a net loss. This was due to excessive inventory and too many small orders which are always expensive to handle.

I mention these studies because they involve principles which are applicable to your business. Wholesalers and retailers who sell textiles must make a profit or cannot stay in business. It is not enough for a dry goods retailer to know that he is making a profit. He must know what items are returning a profit. He may be making a net profit of 6% on cotton prints and losing 5% on something else, leaving him 1% net profit. If he dropped the unprofitable item he would be making 6% net. The Department of Commerce is trying to help business concerns to allocate their operating costs to commodities so that they will know which commodities they can make a profit on.

In other words, there is need to substitute for the guesswork in commercial activity a basis of fact.

Building on fact is what everybody means when he talks about economic planning. Economic planning, as I see it, involves five steps.

1. Defining the problem. Is your problem one of cotton surpluses, too rapidly changing styles, design piracy, cutthroat competition or what? Define your problem.

2. What is needed to solve your problem? Is it statistical information, figures on stocks on hand, unfilled orders? Or is action of some kind needed, such as modification of the anti-trust laws?

3. Where can you get the facts? Which acts are wholly available, which partly available and which wholly unavailable? Many important acts which we should have are not collected by anyone in or out of the government. The Census of Retail and Wholesale Distribution, taken for the first time in 1930, is an example of data that have been badly needed.

4. Take steps to provide the missing data, or to modify harmful legislation or to pass needed new legislation.

5. Having taken these four steps, take the fifth and final step—apply the data and make your economic plan for the future.

What is the economic plan needed for the textile industry? If it were so simple that I could outline it for you in a few minutes, it would be a sign that you didn't really have a problem. And, as a matter of fact, the Cotton Textile Institute has apparently an excellent grasp of the situation, and has done some wonderful work along the lines of depreciation, sales promotion, conciliation, mediation, and arbitration on industrial disputes, cost accounting and new uses.

This last phase of promoting cotton textiles—new uses—is of tremendous importance. It has proved of great importance in other fields. One example that comes to mind in the field of foodstuffs is tomato juice. We have been eating tomatoes all our lives, but just recently have we discovered that ordinary tomato juice, seasoned with salt, pepper, vinegar and lemon and called a "cocktail" has an appeal to old and young, in winter and summer, and has the approval both of the prohibitionists and non-prohibitionists.

To mention only a few of the new uses proposed for cotton, all of which you are undoubtedly more conversant with than I am, there are stationery, formal clothing for

men, road surfacing, pressed panels of cotton and wood, cloth lining for freight cars loaded with fruit, levee construction, etc.

Parallel to the benefits of new uses is simplification, which means merely the elimination of useless duplications.

To get back to economic planning we have made an attempt, in the Marketing Service Division of the Department of Commerce, to list, in an entirely informal and unofficial way, some of the points of information which we believe are essential to a plan for an industry or for an individual company.

I have here a list of the major items we believe should be included in any economic plan. They include Production and Distribution factors and coordination between the two.

PRODUCTION

- Plant
- Raw Materials
- Labor as an Element of Cost.
- Fuel and Power Cost
- Efficiency of Manufacturing Operations
- Production Research

DISTRIBUTION

- Each Industry's Own Labor Considered from Angle of Consumer Buying Power
- Analysis of Costs
- Uniform Classification of Products
- Marketing Policies
- Education of Distributors (Costs and Profits analyses; warehouse and retail store modernization)
- Assistance to Distributors
- Consumer Education
- Advertising and Publicity (To assn. members)
- Market Potentialties Research

COORDINATION

Production and Distribution
and
Cooperative Service Units

- Accounting and Statistics
- Production Budget (Based on sales quotas unfilled orders, stocks on hand and market research, and seasonal variations in relation to stocks
- Financing
- Cooperative Service Units

Under the *Distribution* heading "Market Potentialities Research" we have these subjects:

- Unfilled Orders
- Stocks on Hand
  - Manufacturers
  - Wholesalers
  - Retailers
- Price Trends
  - Long time
  - Current
- Sales Trends
  - Long time
  - Current
- Tonnage and Dollar Volume of Sales
- Competition within Industry
- Competitive Industries
- Substitutes and Analogous Products
- Channels of Distribution
- Consumers' Preferences
- Consumption Trends
- Specific Commodity Indexes
- Other Specific Indexes
- General Production Indexes
- General Business Activity
- Financial Trends
- Cyclical Information
- Employment and Wages
- Other Factors of Consumer Buying Power
- Leader Industry or Commodity Index
- Related Industry or Commodity Index
- Total Sales of Product
- Per Capita Sales of Product
- Regional Sales of Product
- Dispersion by Items
- Dispersion by Types of Outlets
- Dispersion by Consuming Classes

Bear in mind that we have done this for our own information, and not because the Department of Commerce has any idea of dictating an economic plan to business. The Department believes that the trade association is the logical organization to do that.

There is no such thing as a stereotyped plan at present. Here is a plan suggested by Mr. Edwin W. Ebel, in Printers' Ink:

SEVERAL POINTS FOR SOUND ECONOMIC PLANNING

1. Can we plan ahead more carefully?
2. Is our product styled and packaged correctly for present-day conditions? Is it priced correctly for present-day pocketbooks and yet high enough to pay production costs and a fair margin of profit?
3. Have we questioned our selling methods in the same intensive way we questioned and simplified our production methods?
4. Is our sales and advertising presentation sufficiently changed to meet changed conditions, or is it the same as two years ago?
5. What is our attainable volume?
6. What can we do in our industry to eliminate the lunatic fringe?
7. What is our business accomplishing for the social good?
8. Can we add a new product to stimulate off-season sales and thus employ men more regularly throughout the year?

9. Are we working closely enough with our distributors to suggest and point out to them better selling methods, dormant markets, new outlets which exist for our merchandise?

From the many suggestions that come to the Department, one would get the idea that every man, woman and child in the United States had a plan for putting the country on a permanent basis of prosperity. Many of these plans show that most people think somewhat along the same lines. One of the most interesting and well founded economic plans was that suggested by Mr. Swope of General Electric. It suggests uniform cost accounting, public financial statements and protection for the worker. Some of the best legal minds, however, profess to see a very defective legal basis for the plan, because the supervisory control suggested for the Federal government would be at variance with the Interstate Commerce law. Also, the experts say, there are not sufficient actuarial data for the insurance plans suggested by Mr. Swope. However, anyone who discounts Mr. Swope's plan places upon himself the burden of suggesting something better.

The Department of Commerce, while it has not attempted to suggest a panacea for this depression and all future depressions, is cooperating with business in several ways.

In domestic commerce matters we offer a three-fold service to business, as follows:

1. Through the Commodity divisions, such as our Textile Division, which maintain close contact with the trade and which are staffed by men who have a peculiarly intimate knowledge of the commodity in question, and of conditions in the trade.

2. Through the Technical divisions, such as our Merchandising Research Division, which conducts individual cost studies such as the Louisville Grocery Survey, the National Drug Store Survey, and others. This particular division is always ready to undertake a survey of any group which will cooperate financially and administratively in the work. The studies which I mentioned a few minutes ago were made by this division. Occasional studies have been made also of individual business concerns, where it was considered that the revelations of the study would be of general benefit to a trade. For example, such studies have been made of a wholesale paint concern, a wholesale dry goods concern and a wholesale grocery concern. Trade studies have been made also in the fields of confectionery, jewelry, public seating, marking devices, electrical appliances, furniture, and others.

3. Through the Marketing Service Division with which I am connected, we attempt to clear information on business, which we collect from both governmental and non-governmental sources. Every day we receive a stock of letters asking for assistance on business problems. These letters come from trade associations, chambers of commerce, advertising agencies, manufacturers, wholesalers, retailers, and others, including school children. I have selected at random a few of the questions we are asked:

How to market an electric suction cleaner for big buildings?

Where to sell new designs for linoleum, wall paper, and dress materials?

What communities offer the best opportunity for a man with limited capital who wishes to open a retail store?

What is the future of the radio industry?

Where shall I locate my factory?

Ratio of sales prices of industrial products to manufacturing costs?

What percent of the total retail purchases of the country are made by women?

How are business conditions in this state or any other state?

Trend of real estate values for the past 20 years.

Data on expenses and profits and inventory methods in retail furniture stores.

Data on stock control and departmentization in drug stores.

Laundry service in colleges and prep schools.

Total of consumption goods and capital goods in the U. S.

Cost trends and newspaper business.

Advertising expenses in department stores.

Amount of market research done for benefit of advertisers.

Organization of a motor freight terminal.

Cold storage and ice plant operation.

Statistical indexes which might be used in compiling sales quotas.

Ideal geographical lines for major sales divisions for a manufacturer selling through hardware and house furnishings stores.

And many others.

The question now arises, "Are all these studies worth while? Have they a practical value commensurate with the expense and work involved?"

Well, let us disregard the many letters of commendation and thanks that come to us from business men who have made use of these studies, and see if we can trace some tangible benefits.

In the Louisville Grocery Survey, 26 stores were subjected to a very exhaustive and intensive examination for 13 weeks. The cost allocation system used by the Department was so obviously beneficial that many stores in the city revised their systems before the survey was complete.

All except two of the stores studied showed increased profits the year following the survey. Recorded bank-

ruptcies in Louisville grocery stores decreased from 15 the year of the survey to 3 the following year.

A model store was set up in conjunction with the survey and many stores were remodeled in imitation of the model. In one town, Glasgow, Ky., every grocery store was remodeled.

Generally speaking, the information that is made available as a result of these studies is valuable only so far as it is applied to particular problems. We have not been satisfied to keep this information in the files of the Department of Commerce; we are not satisfied to keep it in publication form. We are now engaged in an effort to get groups of business men together in groups all over the country for the purpose of discussing their common problems in the light of these surveys and we put into their hands all the data from our surveys and from non-governmental sources which will arm them for such discussions.

Here in your own state, our District Manager, Marvin Shirley, is putting into the files of chambers of commerce all over the state a great deal of the information we have in our central files in Washington so that these chambers of commerce will have at their finger tips the means of aiding local business to improve and modernize its methods. Mr. Shirley is only one of nearly 40 district managers spread from Boston to Jacksonville and from Seattle to Dallas, all engaged in the same work, and all of them coming into contact, directly or indirectly, with *your* problems, the problems of the textile industry.

But they can help business only in so far as business will permit them to help. The Department of Commerce has practically no regulatory powers, it enforces no rules and collects no taxes. It enjoys the confidence of business men to a rare degree and it is privileged to see the innermost workings of businesses who do not accord that privilege to any other organization. And yet there are business men who grumble at filling out a questionnaire for the Census of Manufactures or who sneer at the practical usefulness of such an epochal accomplishment as the Census of Distribution, undertaken in 1930 for the first time in history in order to tell you men and other business men, where your goods are being sold, in what quantities and under what conditions.

I have digressed rather far from the immediate problems of the textile industry, but after all, your problems are very much like the problems of all other industries. You must plan and you must cooperate and in doing both you must take notice of the fact the solutions of problems of last year are not going to solve present day problems. Things are moving too fast, and only a steadfast determination to sacrifice small immediate individual gains for the lasting good of the entire industry and all those interested in it will accomplish the ends you seek. Your industry is to be congratulated for what it has accomplished through your trade associations and for the intelligent attack that it has made upon its problems through the Cotton Textile Institute.

JANUARY MEETING, NEW YORK SECTION

THE January Meeting of the New York Section of the American Association of Textile Chemists and Colorists convened Friday evening, January 22, 1932, at the Chemists' Club, 52 East 41st Street, New York City, at eight-fifteen o'clock, Mr. Robert H. Gaede, Chairman of the Section, presiding.

...Following the transaction of routine Section business and announcements, the technical program proceeded as follows:

Chairman Gaede: We are very fortunate tonight in having Mr. Irving Kurash with us. Mr. Kurash was suddenly called away on account of sickness in the family. His little daughter is very ill and he received a telegram telling him to come home at once. He rushed uptown immediately. When he got there he phoned us and said that his child had improved considerably in the meantime and that he wanted to come back and speak to us. (Applause). I am sure we all admire Mr. Kurash's courage under the circumstances and we certainly appreciate his consideration for us.

Mr. Kurash of the Aywon Dress Company is going to speak to us on the subject, "The Garment Manufacturer's Problem with Relation to the Finisher and Dyer and to the Retailer."

Mr. Kurash! (Applause).

Mr. Irving Kurash: I should like to discuss tonight the problems a garment manufacturer has to contend with in the course of his business every day. There are several problems we have to deal with, the first of which is the selling of merchandise, and the second, purchasing of merchandise.

I find, after about seventeen years of buying materials, that there enters into the buying of merchandise the problem of dyeing. We frequently have customers come to us complaining about materials. It is not uncommon for us to have a customer come back with a garment and say, "Is this guaranteed to be absolutely pure dye, fast dye, etc.?"

The best way to illustrate the manner in which I answer that customer is this: I usually take out a dollar bill, moisten my handkerchief, and run it across that bill, and that (indicating) is what you get. (Laughter). I say to the customer, "There is a billion dollar corporation, the United States Government. They don't guarantee their dyes. What do you expect of me?" (Laughter and applause).

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I FIND that different materials act differently in the course of processing. Let us take, for example, the silk and wool family. When I receive merchandise from a silk concern it measures 39 inches in width. I take that piece of material and stretch it on a table and let it stay that way overnight. When I look at it in the morning I find that it has shrunk to about thirty-two or thirty-three inches.

That is something of vital importance to the men who are really fundamental in the making of that material. It is the hardest thing in the world to get an explanation for that shrinkage. It always seems difficult to get an explanation from the silk manufacturer for his faults or, rather, the faults of his material.

There are problems in connection with other materials also. Let us take the silk family, or the crepe family.

A woman purchases a dress in a retail store. After wearing it a few times she sends it to a dry cleaner. When she gets the garment back she finds that the sewing thread has changed color. The fabric itself has retained its color but the sewing thread has changed color.

You might ask the question, "Well, was that silk or cotton?"

In answer to that I will say that it might be either one. I have seen both silk and cotton thread change in color. Of course, cotton will change more frequently than silk. So that it is a very important point, in our business, to use silk thread.

We are today in an era of what I call "promotion." In our industry, the dress manufacturing industry, we have to promote ideas—more so today than ever before—in order to sell our product. There must be something either in the design or the fabric to bring it forward, to make it stand out from the others.

We have experienced in the past a few promotional ideas but this think is coming in more today than ever before. And I wonder sometimes whether the silk men who analyze fabrics and are instrumental in constructing and getting up fabrics can't get out a cloth (disregarding design and pattern), a plain material that we can present to the retailer and then to the consumer, giving him a true statement as to the qualities of that particular material.

We are governed, I find, today more than at any other time by something that is governing your industry and that is governing, I daresay, practically every industry in the country. It is a little word of five letters. It governs our every move. I refer to s-p-e-e-d—speed. We are living in an era of speed. Everything is done with speed. It seems that it has to be done that way. Evidently it is due to the new blood that is surging in, the younger generation. But at any rate everything today involves speed.

I might illustrate that in this way: Two fellows bump into each other on the street. One says, "Hello, John."

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"What's your hurry?"

"Nothing."

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That is typical of the era in which we live. In our particular business, customers come to us and look at samples of garments and they want delivery the day before. Of course, that can't be done, but it just illustrates how everything has to be done with speed.

You get up in the morning and dress speedily. You go to breakfast and eat speedily. You get into the subway and you want to get downtown speedily. You get down to your place of business and you want to do things in a hurry. If some of us had sixty-eight hours in the day it wouldn't be enough for us. We want to do things hurriedly. It is as I say typical of the era in which we live.

Coming back to the question of the manufacture of silk I find that some silks act differently, under the same conditions, than others. As an example, let us take a piece of pure dye crepe. We give that out to a pleater. In order to have that pleated he must put it into a steaming process. That steaming process is a mechanical thing. It is set by a gauge. A certain pressure of steam is necessary to make those impressions on the material.

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The material is left under that pressure for a certain length of time and when we take it out, we have the pleating.

Only recently I found that we gave out a piece of material which was thirty-one inches in width. When it came back it was twenty-seven inches. There was a shrinkage of four inches. That should never occur in any sort of material.

Coming back to the silk and wool family I have in my experience found garments in which the color in parts of the garments changed, notably green. I can't as a layman, understand the reason for that, but it is a very peculiar thing to see a dress, made out of the same piece of material, with one color on one side and a lighter or darker shade of the same color on the other side.

I also notice that certain colors react differently under artificial light than they do under natural light. Let us take, for example, blue. There are certain colors in the blue family which give a purplish cast under artificial light and a bluish cast under natural light. There evidently is something in the treatment of those materials, either in the chemicals that they use in the dye or in other properties, that causes them to give that reaction.

At any rate, I should like to see the day come when we can go to our customers with a fabric and say to them, "This will do so-and-so," and "This one will act in such-and-such a manner."

I have some prints which were sold to me and guaranteed to be pure dye, fast dye.

To digress for a moment I might say that we are a very, very strict house in the matter of accepting garments that are returned. We have a reputation for being very strict in that regard, and we will not take back merchandise unless they are returned for some absolutely legitimate reason. Once in a while you get a customer who will return merchandise for no good reason at all; he just wants to make the return.

As I was saying, I have some prints in my place in which the color ran. After using about four hundred pieces of this particularly print—and each piece contains about sixty yards—I found that in the last few pieces, possibly the last six or seven pieces of that lot, the dye ran on the material. That was probably due to another faulty condition somewhere in the treatment of that fabric.

Coming back to the silk and wool family, this is where we find the most faults. From my own experience, I am of the opinion that this may be due to atmospheric conditions. If you take a piece of that material and expose it in damp weather, it will react in one way. If you expose it in bright, clear, sunshiny weather, it will possibly retain everything.

You men are instrumental in building up these fabrics. You are really responsible for what goes into the fabrics. I should like to know from you if there is not a remedy somewhere that can be applied, so as to perfect these garments as far as the dye is concerned. Whether there is such a thing as absolutely guaranteed fast dye, I don't know. It is often said that there is but, after all, you can't kill anybody if their products don't live up to their claims for them.

I would be very much interested, as I say, in knowing the reaction of various kinds of dyes on materials.

Some time ago a silk man came to me with a cloth which he was offering for sale. One of the arguments he gave me for taking this fabric was that it was absolutely sun-proof and moisture-proof.

I haven't yet seen a garment that has been worn that has been proven to be absolutely perspiration-proof. I do know there are shields made that will stand perspiration but I have never known of a fabric made into a garment that would stand it.

In that connection, I heard a scientist say some time ago that the matter which a woman gives off in perspiration is so strong that if it was injected into a little mouse, the mouse would not survive. (Laughter). How true that is, I don't know. I am just telling you that as it was told to me. It would depend, I suppose, on the amount that was injected into the mouse. But that will just give you an idea of how strong the matter that is given off in perspiration is and as I say I have never yet seen a garment that was absolutely guaranteed against perspiration.

I think that you men are absolutely fundamental in upholding our industry, by the chemicals and dyestuffs that you use.

I wonder, Mr. Gaede, whether you can enlighten me as to the procedure that is followed in the matter of these dyes, the process, how they are treated in the beginning when they are put on the fabric. I would appreciate it if you could let me know how that is done.

Discussion

Chairman Gaede: Do you want me to answer that now?

Mr. Kurash: Yes, please. (Applause)

Chairman Gaede: Mr. Kurash has certainly summed up the problems of the garment manufacturer very thoroughly, and some of us who are in the dyeing business have met these problems day after day. They are not new to us. They are, as a matter of fact, quite old. They will continue to come up from time to time.

Probably one of the reasons for not having faster materials is answered by the test which you gave to the dollar bill, early in your talk.

There are certain dyestuffs which will stand certain conditions and some will stand them much better than others. The dyers usually have research departments to study these things. They are in constant contact with the dyestuff manufacturers and it is for that reason that this organization exists. We are conducting research into the fastness of dyes to various tests, and also on

standardizations, and standardizing methods of testing. One of the faults has been the variety of methods of testing materials and, as I say, that is one purpose that this Association serves.

I can assure you, Mr. Karash, that the dyers, the manufacturers of dyestuffs, and particularly the members of the American Association of Textile Chemists and Colorists are working hard on this, and while I will leave it to the members to discuss some of the individual problems, that, I might say, is one way that these problems are being met now.

I will ask if there are any questions or if anyone would like to answer Mr. Kurash on any of the points he has brought up.

Mr. Kurash: Just a moment, please.

I just want to extend an invitation to the members of this organization. I will be only too happy to have any member of this organization visit my place at any time at all. I will be glad to take him through our plant and show him how some of the materials act.

I meant to say before that we get a great deal of this reaction in our pressing department. We have recently installed, at great expense, a most modern pressing apparatus. It is a steam apparatus. It presses the material by steam. It has the regular iron. Holes are drilled in the bottom of the iron. The holes are of a certain shape and the steam issues forth from them. That is connected to long pipes through which the steam comes. I might say that we are practically carrying on experiments in our organization with this pressing equipment. We find that certain materials act differently from others in the pressing. We find that in certain materials designs are formed, and in other materials the dye will take one color in one spot and another color in another spot.

I just want to extend that invitation to any member of this organization who is interested enough to visit a dress establishment and see how we manufacture our garments.

Chairman Gaede: I will again ask if anyone wishes to ask Mr. Kurash any question or answer any of the points which he has brought up.

Mr. Ephraim Freedman: Mr. Chairman, it appears to me that the points brought up by Mr. Kurash or the problems that confront him are typical of the problems that confront other people in the industry and it points all the more forcibly to the need for the standardization of merchandise, for the evolvement of standards, and for the certification of merchandise by some responsible party. In other words, if a salesman calling on the garment trade can give the garment manufacturer assurance as to the durability or the performance of the article to be sold, a good many of these problems ought to melt away. I think that passes all the way down the line to the consumer.

Chairman Gaede: I think we are getting there more and more, year by year. The process is slow but I think we are getting closer to that point all the time. Of course, depressions such as we are going through now bring out a great many things which during times of prosperity are overlooked. But at least we are headed in the right direction.

Do you want to say anything about that, Mr. Kurash?

Mr. Kurash: I will say this: that we are giving values in our particular field today. We manufacture a popular priced garment that is sold at wholesale for $10.75. I can honestly say—and I think I will be backed up by almost everybody in the industry—that that garment is of the same value as the garment that five years ago was sold for about $22.50. The materials that are used today are, I think, much better than those that were used previously. The public seems to be getting educated to the point where they are demanding finer materials and we have to give them what they want.

Some five years ago when we were infants in the business—I am referring to our own organization—we used materials for garments which today I wouldn't use for anything except linings of garments. That will give you an idea of the decided change that has taken place within a period of five years. Garments which were made up five years ago to sell wholesale at $22.75, which I, myself, sold at that price compare rather favorably—I doubt if they surpass—the values that we are today giving at $10.75.

That just gives you an idea of how the public is being educated. They are demanding more and more every day of the manufacturer, and of course we in turn demand that much more from the silk manufacturer. It goes on that way right down the line.

Chairman Gaede: Would Professor Olney like to answer Mr. Kurash in any way?

Prof. Louis A. Olney: Mr. Chairman, it is so seldom I am able to visit this Section, that it is a double pleasure to be with you this evening.

There are one or two statements I might make that may cover some of the points that have been brought up.

In the first place, I think the choice of dyes is a very important matter. If we should look over our whole list of available dyestuffs we would find certain ones that would give the undesirable effects that have been mentioned, whereas if that same list were scanned a little more carefully and might I say more intelligently, dyes might be found that would give dyeings and prints sufficiently fast to meet all of the requirements.

In the second place, the matter of cost enters in. Today the ultimate consumer is looking for low prices and that naturally makes the garment manufacturer anxious to produce coats and suits at a lower cost and as a result he demands from the cloth manufacturer, the dyer, and the printer, fabrics at a very low cost. It may be that for the particular cost demanded it is impossible to get out a fabric that is fast, whereas if a few cents a

yard more were spent upon that fabric it could be dyed or printed perfectly satisfactory.

I think the trouble today more than anything else, is this demand, which is constantly increasing, for cheaper and cheaper and then cheaper goods, and the textile manufacturer has almost gone bankrupt trying to produce them. In fact, there are many textile establishments that for several years haven't had anything at all like a satisfactory profit. Most of them are in the red. Hundreds of them have been pushed out of business by this constant demand for cheaper and cheaper goods.

You can come back and say they are fools for continuing to produce them, and very frequently I think they are. Yet, on the other hand, they go on the theory that it is cheaper to run than to shut down. Some of them are beginning to find out that perhaps, after all, that is a fallacy. Some of them are already out of business but they haven't found it out yet.

Unfortunately, there are certain very brilliant colors and very desirable colors that are inherently fugitive. Take some of the very brilliant and beautiful pinks and reds, for instance. They are not at all fast to sunlight and for the most part not satisfactorily fast to washing and it would be practically impossible, with dyes available at present to reproduce this great brilliancy in these exact colors and have the dyeings or printings absolutely fast. So here again there has to be a choice of colors in making up designs that will give a satisfactory effect without introducing these particular dyes. Furthermore if extreme fastness is desired I think that if the garment manufacturer would work a little bit more closely with the cloth manufacturer, dyer and converter, oftentimes many of these difficulties could be overcome (Applause)

Chairman Gaede: Thank you, Professor Olney.

The procedure seems to be reversed tonight, and it is quite interesting. Our speaker is asking us questions instead of us asking the speaker questions.

Mr. Kurash: I just want to correct you on that, Mr. Chairman. I just want to say that I am here as a layman. I am very much in the same position as a student going to a professor. He wants to gather knowledge to guide himself by in the future. That is what I would particularly like to get here tonight and I believe I am before a body where I can get it. (Laughter))

Professor Olney: There is one other point.

Mention was made of the fact that out of a lot of 400 pieces the last few pieces were unsatisfactory. If such situation exists as you say, that is apparently up to the printer or the dyer because if the first 396 pieces, or whatever the number was, were satisfactory and only the last four were unsatisfactory that naturally must be his fault. On the other hand, I wonder if the last four pieces received exactly the same treatment on your part. That is an important point.

Mr. Kurash: I will answer in this manner, Professor: this occurred in just the last few pieces. The printer evidently was feeling his way out and thought he would cheapen the print a little bit, or the dyestuffs that he was putting into it. I don't know whether he did that, or just hurried the matter along. Personally, I think he was just trying to get a little more out of it than he possibly could, because he had plenty of time. (Laughter)

Mr. Karl M. Herstein: Mr. Chairman, Mr. Kurash expressed the hope that some day he would be able to tell his customers exactly what a piece of goods will do, and stand back of it. There isn't one of us here who doesn't know that that day is here now. He told us that in one lot of 400 pieces, four or five went bad. If Mr. Kurash had spent the price of those four or five pieces of goods on the salary of a man who knows how to test goods and how to examine them, he could very readily have found out their properties and, having a competent man, could have told his customers what those goods would do, and how long they would last, and stick to his statement. (Applause)

Mr. Kurash: I think I will have to fire that "competent man", because that is myself. (Laughter). I am the one who is responsible for all those materials.

As I said before, it may be that the printer was hurrying the goods, or that he was just trying to stretch a point and get a little bit more out of them.

I certainly take the trouble, when I get materials, to test them out before I put them in the process of manufacture. That is the point I was trying to bring out before: that sometimes those materials act differently than they do at other times. I can't take a piece of material that I get from a silk merchant and put it through the whole routine of testing. I can't put it through the operation of pleating, steaming, pressing, etc., because, once I do that, the piece of goods is mine, even though I may not want it. (Laughter)

Mr. Barbour: I should like to ask Mr. Kurash a question.

The dyers have their faults in getting chafe marks, dyespots, etc., in goods. These goods are folded in layers and occasionally a defect occurs in the middle. If such is the case, the manufacturer just tears the layers off and fires the goods back at the men.

Is there any way that that can be eliminated?

Mr. Kurash: The best way I can answer that is as follows: You know, we aren't responsible—in a way we are and in a way we aren't. It all depends on the way the goods are folded. If they are folded in what we call "book" folds we may be partially responsible. But if they are on rolls, we have to unroll every piece of goods and examine it to find out if there are any defects in it before we can cut into it.

Let me just say this: it is not up to us to see if there are imperfections in the goods when we get them at our place. It is up to the printer or the silk man to find those before he sends out the merchandise. He should know whether or not there are any imperfections in a

piece of material. If there are, they should be properly classified or marked, so that when the manufacturer receives it he can look for an imperfection in that particular spot. If there is a classification of that merchandise, he expects to find some imperfections, and that is offset by the allowance which he receives for that classification.

Chairman Gaede: Are there further questions?

President Wood: Mr. Chairman and Gentlemen: I am a little diffident about getting up to talk before this Section because I talk too much, but I assure you it hurts me more than it hurts you. (Laughter.)

Mr. Kurash in his remarks referred to a word of five letters which affects this industry and all industries today. That is the word "speed." I think we might say there are two words of five letters that affect industry very seriously and those are the words "speed" and "price."

All through life we generally get just what we pay for, and it isn't quite sufficient to say, "Well, we pay the market price," because the market price may not be the price that commands that particular type of work that is really very desirable. However, I don't know that we can control the matter of speed, except within certain limits, and I think to a certain extent it should be controlled because I would say that the correct speed at which to process any merchandise is that speed which is commensurate with good workmanship, and any speed in excess of that is not a correct speed.

As far as price is concerned we know it is a tendency of the times to—shall I say the word?—"chisel." (Laughter.) We have all heard the word used. We have, most of us, experienced it, Mr. Kurash I suppose along with the rest of us. (Laughter.) And that is rather regrettable, when we sacrifice quality to price. But I think we are within almost measurable distance of the time when quality will once more hold sway.

Mr. Kurash referred to the matter of fastness, and I would remind him that fastness is really only a comparative term. A fastness which may be perfectly satisfactory for us in one fabric is certainly not the proper standard for another. A washable fabric manifestly must be very fast, but in a fabric which is never required to be washed certainly it seems ridiculous to ask for such a qualification. It only puts a limitation on the dyer, printer, or finisher, which is unfair.

In that connection, I might say that the difficult thing is to convince the manufacturer who wants fastness of the limitations which are attached to that requirement.

Professor Olney touched on the subject of certain bright pinks and reds which it is impossible to make fast, and I know that is the case on silk goods. I think it is on most goods. And these limitations are not respected by the trade at large, probably because they haven't been sufficiently educated to that point.

I think it is well that we have Mr. Kurash here tonight, so that we can give him a few facts, in order that he may act as our ambassador with the trade and tell them a few things we would like to tell them, ourselves.

If the manufacturer will accept those limitations which are not set by the chemist but are set simply by circumstances, the circumstances being that we have no dyestuffs to give that degree of fastness for that particular shade, then I think, as Dr. Olney has wisely said, we can supply the manufacturer with the desired degree of fastness.

Take the matter of washing, for instance. It is perfectly possible to give a certain range of washable colors on silks—I speak of silks because I handle them—if we can confine the dyeing and printing of those fabrics to the use of certain dyestuffs which we know to be fast. But when we are pushed to do the impossible, then we must either sacrifice one thing or the other. A sacrifice must be made in any event, either of fastness or of desirable color. But there is quite a reasonable range of reasonably fast colors, and as I say it is merely necessary to keep within those limitations to get the satisfaction that you are seeking.

There are certain other types of fastness that you refer to. For instance, there is the matter of perspiration, which has had the attention of our Association for a great many years, as long in fact as we have been in existence.

Incidentally, I might say to you that you have here before you and in the membership of our Association what I call the "quality men" of the textile industry. These men are seeking to give you that quality which you desire and probably deserve, provided you live within the limitations, and they are only too willing to do it, if limitations of price, speed, and color requirement are not placed beyond their reach.

The matter of shrinkage is more of a mechanical subject and I shan't touch on that any more than to say (I think there is at least one manufacturer in the room) that this is probably due to the manufacturer more than the dyer. If the manufacturer sends to the dyer a piece of goods forty-four inches wide in the grey, which naturally finishes to thirty-nine inches, the result is satisfactory. If, however, he sends a piece of goods forty-one inches wide, which no one on earth can finish to thirty-nine inches, and then insists on having it finished thirty-nine inches by dint of a great deal of excessive stretching, one cannot expect anything but a poor result because invariably that overstretched fabric will retire to its normal width if it is left in the air for any length of time, and when that is made up into a garment undoubtedly you will have a great deal of trouble from that source.

You spoke about the shortcomings of the printer. I would like to have you know that the printers are really, with very few exceptions, a very high type of people. (Laughter.) But, like the dyers and the finishers, they are also held within certain very narrow limits which

grees of expertness, however, and if as you say the printer turned out 394 pieces correctly and six pieces incorrectly, naturally there must have been some error on his part. It isn't quite clear to me whether you meant that the goods bled on exposure to water or whether they were bled when you got them printed.

Mr. Kurash: That was after I had received them. I might say that it was after they were sold. They were returned to me by customers, due to the dye running in different places on the made-up garments.

Mr. Wood: After washing?

Mr. Kurash: I don't know whether they were washed. They may have been. Even if they were washed, I don't think that should have happened because, judging by the 396 pieces that had gone before, they were all right and surely there must have been some dresses made up out of the material from those lots that were washed and we never had any trouble from that source. It just happened on the last few pieces that were given out to be made up, and, as I say, I think it was probably the dyer's or the printer's fault for rushing the goods through more than anything else. I don't know whether he cheapened the proposition a bit or not, but after hearing what you just said about the type of men the printers are, I don't think he did that. (Laughter.) I think that he just hurried it along a little bit. (Laughter.)

President Wood: Well, I am quite sure you didn't send the man four pieces to print. If you did, I don't blame him for giving you a bum job (laughter) for it would ruin the poor chap if he had enough lots of that size to run.

Undoubtedly, every dyer and every printer wants to turn out a first-class job and if he is not required to do something outrageous either in the way of price or in the way of delivery, he is fully competent to do it.

Mistakes will happen in the best regulated of families, of course. Mr. Barbour, I think it was, who referred to spots. Well, occasionally a spot will arise, because of undissolved dyestuff or something extraneous dropping onto the goods which can't be removed, and those troubles we are all heir to. In fact, if you will show me any piece of print in your place, I don't care how perfect you say it is, I will show you defects in it.

The thing that bothers me about the criticism leveled against prints is what I call the unjustifiable, picayune criticism which I feel sure those same prints would never be subjected to by the ultimate consumer—and after all it is the ultimate consumer that we want to please. I feel quite sure that a great many, call them substandard goods, if you will, if they were allowed to go through would never be a cause of complaint. If the color is good, the combination pleasing, a slight mechanical defect, giving shall we say a rough contour or a little overlying of one color on another will not be noticeable to nine hundred ninety-nine men out of a thousand. I am quite sure if I were to take the worst printed piece that we may have turned out in the last six months and have a very nice dress made up out of it and if I were to give it to Miss Siegel she wouldn't object to it at all. (Laughter and applause.)

Chairman Gaede: Thank you, Mr. Wood.

Are there any further questions or remarks? If not, we will go on to the next paper.

We are also very fortunate tonight in having another discussion along this same line. We have with us Mr. E. Philbin de Got, Sales Manager of the Eastern District of Belding-Heminway Company, who will speak on "The Manufacturer's Problem with Relation to the Retailer and Garment Manufacturer."

The Manufacturers' Problem with Relation to the Retailer and Garment Manufacturer

By **E. PHILBIN DE GOT***
Belding Hemingway Co.

MR. CHAIRMAN, GENTLEMEN: I came down here this evening by trolley car. A woman got on with a little boy for whom she did not pay a fare. The conductor said, "How old is that boy?"

"He is five years old," she said.

The conductor said, "He looks ten years old to me."

"Can I help it if he worries?" she asked. (Laughter.)

I have been given a question to discuss here tonight that is rather broad: What are the standards of the manufacturers in filling the requirements of the retailer and the garment manufacturer?

Well, ever since the world began—that was a long time ago—man has been trying to fill the demands of women and that has been your job and that is my job, too. When you went to school as boys and later when you went to college, little did you think that you would be doing all

* Presented at January Meeting, New York Section.

this work and study to cater to the whims of women. You know how women are, going from one thing to another, and you in the chemical laboratory have to figure out just exactly what they want. You have to figure it out in a test tube and then bring it out in a piece of silk. That is quite a problem. (Laughter.)

On the question of standards—we have to deliver goods according to certain specifications and those specifications are what are required by the retailer. It is often thought that the retailer establishes a fact with a woman as to just what her requirements are but I can't help but feel that it is quite the contrary. The retailer will promote many things, say, a hundred, and out of those hundred there will be one or two that will cling and the woman will buy them, and that creates a demand because you are filling the requirements of a woman.

You have these meetings here with the view to filling those requirements, maintaining standards. You can't keep on cheapening goods forever. You can't manufacture goods for less than you do at the present time. As Professor Olney said, a lot of them are working twenty-four hours a day and I think if some of them stopped to take inventory they would find they were out of business. (Laughter.)

The prices of dyeing goods have fluctuated downwards and today there is really no price. You have to sell your goods in the market today on a quality basis because everybody has a standard construction of piece goods, and it is a question of producing something that is worthwhile to the ultimate consumer, thereby maintaining a good standard.

In our own particular business, we manufacture more than piece goods. We manufacture threads and hosiery as well.

To give you an idea of the requirements we have to conform to—and they are those that are given to us by the department store, when we receive goods, we examine them in the grey and they are classified. Then they are sent to the dyer and he dyes them and finishes them. When those goods are returned to us we examine them again and they are classified according to the number of defects, major, medium, and minor defects. That report is made in duplicate and a copy of it is sent back to the mill, to be compared with the goods that were woven in the grey.

So, you see, we have a pretty accurate check on our goods, and all this is done to maintain a standard.

Then we have our hosiery. If any of you were ever in the hosiery business, you know that there is a business in which through new ways of manufacturing and price-cutting they can produce hosiery at a very low price today, and the standards are very low. You can cheapen a stocking in so many different ways and apparently show the same stocking that you have been giving to the customer for a long time, but it will prove to be of inferior quality sooner or later. I should like to give you an idea of our standard on stockings. I can't tell you the many things that are involved but take a simple little thing like a four-inch welt at the top of the stocking.

You say, "What is the difference?"

Here is another fellow with a three-inch welt, and they come with two-inch welts.

We have conducted an investigation—when I say "we" I mean the men in the hosiery business—and it is accepted that for practical service and practical wear you must have four inches in the welt, to make it sufficiently wide so that that garter will aways be able to get into the welt, because if it gets in below the life of the stocking is very short.

There again we are maintaining a standard and giving the retailer something that will bring his customer back into his store again, which of course is very essential.

We have also the thread business. You say, "Silk thread? That is nothing. A thread is a thread."

We have to maintain a very, very severe standard on threads. As you can readily realize, the intrinsic value of a thread in the garment is very insignificant. It is practically negligible. But the inconvenience and the trouble that that can cause you if it doesn't work properly is very expensive.

So we have a standard and we have a common denominator of 6000, and all tests are conducted on that basis. For example, in an ounce of silk, Size A, there are about 1200 yards of thread and that thread will pull five pounds or more. Therefore, you multiply the pulling of the thread, in pounds, by the length, and you get 6000 or better, and if it doesn't pull 6000 then your thread is inferior and it won't stand up.

We have the same problem in dyeing. When we dye our threads we have to use good dyestuffs. When we dye our hosiery we have to use good dyestuffs, and when we send our goods out to be dyed, we have to send them to good, reliable dyers.

I was in Cleveland about two weeks ago, selling a man a bill of goods, and he said, "Well, I will buy this but where was it dyed?"

I told him.

He said, "I want the goods dyed in that same place because I know they do very good work."

So you see that men way out in Cleveland who was buying linings for the coats that he makes—a man not in the silk business—knew a dyer in Jersey and he knew that that dyer maintained a standard. He knew if that dyer's seal was on those goods the goods would be satisfactory.

We know other dyers to whom we give business whose work is just as good but they are not known. They haven't established a standard. So that particular house that he specified to dye these goods naturally got the

business. Why? Because we want to make a sale and we are going to give him what he wants, and it dovetails in with our idea of doing business, establishing a standard and giving a man what he wants.

When you work you get something for it. You get a dollar. You put it right in your hand.

You have these meetings. Mr. Gaede was outlining to me the different kinds of meetings you have been having and it is very interesting and constructive. You are not actually putting the dollar in your hand, it is true, but it means a great deal to you men to be able to establish what is required in the market that you yourselves are actually catering to. You are selling something. You are selling a method of dyeing goods, which is just as much a part of the actual sale—this will be interesting to Mr. Kurash—as anything else you do in your particular dye house.

When we are in a position to get a good-sized order and we have a lot of grey stock—that is the unfinished goods—we are obliged sometimes to shop for a price in dyeing and the man that will give us the lowest price and the best work is the one who gets the business. But I will be frank to say—and I have a great deal to do with the sales there—that we avoid that as much as possible. We are aiming all the time to maintain a standard, to give a man what he wants and to give him satisfaction.

You know that a woman doesn't know how to dye a piece of goods. She goes into a store and she demands something. She demands a certain finish on the goods, a certain feel, because she knows that that is something she can get. She doesn't know how to dye goods, but you do. That is your business. If you will not cheapen your ideas, if you will not cheapen your methods, you will give that woman something that she will like better than the thing she is getting in many instances today and you will put her in a position to pull us out of this depression.

When people talk about the depression I can't help but think of golf. I don't know how many of you play golf. I am one of the worst players in the world, myself. But a fellow goes out and shoots a round of golf. Week in and week out he shoots, say, around 100. He goes out one day and gets his score way down to 92. Somebody says to him, "Do you play golf?"

"Sure," he says.

"What do you shoot?"

"Oh," he says, "around 92." (Laughter.)

Well, 100 is normal. 1932 is 100. Let's not close our eyes and make ourselves think that we are back in 1918 shooting 92 golf. That isn't our game. Our game is to shoot 1932 golf, around 100, and if we can realize that and realize that these conditions are here to stay, that they are not depression conditions, we will be much better off. As a matter of fact, we are basing our plans in our business on that premise. We are not waiting for things to get better. We are accepting conditions today as the conditions of tomorrow and on that basis we are out to make money, and I feel that if times do get better we will have just that much more velvet to work on.

There is another fallacy that you men don't come directly in contact with and that is that a retail department is obliged to meet the figures of the previous year, not only weekly but daily. Every day they know the sales of the previous year for that day. But it is very difficult for them to meet the sales of the previous year because there has been a tremendous price reduction.

So that the buyer goes out into the market and he buys your goods. I say "your goods." He buys what you do to the goods. When that buyer goes out into the market he must get something that is very cheap, because he must have a tremendous volume. He must have a quick turnover. Everything must be done quickly.

A buyer comes in and says, "I want something for a special."

"How about a regular number?"

"Well, a little later, but I want something for a special right now."

Then don't you see what we have to do? We have to turn around and go to you and ask you for a special, too. We have got to say, "We want a little special now, ourselves."

"How about a regular number?"

"Well," we have to say, "we will give you that a little later. (Laughter.) Right now we need a special."

This is a thought that occurred to me while I was sitting here: The value, or what a store paid for, we will say, silks, represents a certain amount of money. The general market depreciation in that value is, let us say, twenty or twenty-five per cent. Then why couldn't the figure at which that buyer would have to shoot be in the neighborhood of twenty-five per cent less than the figure that he had a year ago? That is only logical. That only brings us back to normal conditions not depression but normal conditions.

How far does that go? It means simply this: that if a buyer is in a position to go out and buy rationally and not be obliged to press and push we, in turn, won't be obliged to press and push and we won't have to go out and sey we have got to have things cheaper.

So, if we maintain quality—as we always will, as far as our outfit is concerned—and keep away from price we will be in a position to establish business on a much sounder basis.

Thank you. (Applause.)

DISCUSSION

Chairman Gaede: Mr. de Got has certainly brought out the problems that he is confronted with. While many of us now feel informed on some of these problems, still there may be some that have been overlooked on which they would like to have enlightenment. Are there any questions that anyone would like to ask Mr. de Got?

Mr. Kurash: I should like to ask Mr. de Got a question, Mr. Chairman.

I should like to ask Mr. de Got just how they treat their sewing silk, whether that is supposed to be fast dye and is guaranteed as such, and if their cotton thread will act differently than their silk, pure silk.

Also, Mr. de Got's golf story reminds me of one. You know, I play golf with a young fellow and every time we go out he beats me. I never knew why it was until one day I was right alongside of him when he came up to the ball and I saw the way he counted, and that is the way he got his scores: Before he goes out he usually calls the caddy over and asks him, "How much is three and three?"

"Six."

"How much is two and two?"

"Four"

"You better go back," he says and calls over another boy, usually a little colored fellow who hangs around there and he says, "Young fellow, how much is three and three?"

"Four."

"How much is two and one?"

"Two."

"All right, come along with me." (Laughter)

That was how he beat me usually.

But I should like to know something about sewing silk. I am very much interested in that. I know you folks are rather large handlers, if not the largest, of that product and I should like enlightenment on that question.

Mr. de Got: The silk thread is dyed, again, to fill a requirement. We have all kinds of silk threads. We have thread that is perspiration proof, and that is used in men's clothing. We have thread that is used for hemstitching and that is boil-fast. Where it is necessary to have silks boil-fast—and that is about as severe a test as you can make—we have them so.

But what we try to do, again filling a requirement, is to have the silk thread dyed to the same degree of wash fastness as the silk on which it is going to be soon. There is good reason for that.

If you wash a dress that is sewn with boil-fast silk and the dress itself is not boil-fast—I don't think there is such a thing in the market today; I don't know of anybody that is selling boil-fast piece goods—the dress will lose a litle bit of color but the thread won't. Pinks particularly will fade out a little bit in washing. But if your thread is boil-fast you are going to have an unsightly seam there. In order to avoid that we have the threads dyed so they conform to the standards required in the piece goods. We dovetail in with the requirements of the piece goods.

Speaking about washing fabrics, this spring the manufacturers are going to be called upon to deliver a lot of high colors, reds particularly, and I think you all know what red is when you are dyeing it. This is just a suggestion. We will be called upon to have our silks particularly wash-fast this spring and you men who are handling silk piece goods are probably aware of that fact by now. It would be well to safeguard yourselves on the washability of your silks for the spring.

Chairman Gaede: Does that answer your question?

Mr. Kurash: Yes, sir.

I should like to ask another question.

Are there any adjusters in the silk industry in this room? (No response.) (Laughter) That leaves me kind of blank in asking my question then. I just wanted to get an idea from some adjuster as to how he would settle a claim, not involving myself, where a fabric has a certain reaction. As long as there aren't any adjusters here I shall have to "lay off" awhile. (Laughter)

Chairman Gaede: Is there anyone who wishes to answer that question?

Mr. Kurash: It will not be held against you. (Laughter)

Chairman Gaede: Do you want to answer that question, Mr. Wood?

President Wood: How about Mr. Bergh?

Mr. Bergh: I would rather not answer such a question. It is a very large problem.

Mr. Kurash: They say that silence means consent, so I will take it that way. (Laughter)

Chairman Gaede: Are there any other questions?

Mr. Ephraim Freedman: Mr. Chairman, I should like to ask Mr. de Got what his experience has been in so far as competition is concerned. I mean by that where people have turned his merchandise down because they were able to get it at a lower price, have they come back to him, or has he lost accounts on account of it, or has he gained accounts?

Mr. de Got: You ask some difficult questions. (Laughter) I shall have to answer a question like that in a general way, of course.

On certain quick turnover items it is a case of just closing while your man is there and there is no gauge to tell whether or not you have lost an account because you really never have it. In today's market there is a great deal of quick turn goods. I call it "quick turn." A buyer will come in and he will want something for the following week. He will come back in two or three weeks probably that he will want something else for the week after that. You get the picture, don't you? He is turning goods over very rapidly, as I say, to meet last year's figures.

But on staple numbers, in a store where a number is established, you don't meet a great deal of that, because if you give your goods the proper treatment, proper dyeing, proper finishing, and it is uniform and has the proper weighting so that one piece isn't a lot heavier than the next, you will hold your customer and he will be satisfied, because in that case the store is giving some-

thing to its customer that its customer can come back and get not only tomorrow but a week later, a month later, or even a year later. That customer will come back to that store and get those same goods again. Those are what you might call the "bread and butter" items of the store. They are the backbone of the business. Sale goods aren't. Sale goods are just for the purpose of getting them in and selling them, in many cases, these bread and butter items. We feel that if we establish a number with a customer and it is good and we maintain our end of it, as a rule, we won't lose that customer.

After all, the standards of a store are really established by the standards of its customers and if a customer comes in and is satisfied with the goods he gets in that store, which are carried as regular stock numbers, he in turn will come back and buy more.

Does that answer your question?

Mr. Freedman: Yes.

(*To be continued in the next issue of the* REPORTER. *An interesting discussion takes place on the subject of "creases."*)

Note

A complete account of the Quarterly Meeting of the Piedmont Section will appear in the next issue of the REPORTER.

LOWELL TEXTILE INSTITUTE STUDENT SECTION MEETING

IN view of the recent change in the Constitution of the Association authorizing student members, a meeting was held Tuesday, February 2nd, at the Lowell Textile Institute to arrange for a new section that would be a continuation of the former Junior Section. Thirty-four students indicated their intention of joining and the following officers were elected to serve (protem) until applications for membership have been accepted.

Joseph J. Pizzuto, Chairman.

Raymond L. Matthews, Secretary.

Executive Committee

Henry A. Wells, Lorne F. Howard, Leo Gleklen.

Respectfully submitted,

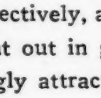
RAYMOND L. MATTHEWS,
Secretary.

Correction

On page (39) 51 of the January 18th issue in the discussion of "Practical Problems of Wool Dyeing," the name W. L. Sjostrom should have been C. G. V. Sjöström. In the last paragraph, first column, on the same page the line which reads the "Lowell School" should read "The Valley Worsted Mills, Providence, R. I."

ASSOCIATION BADGES

The lapel button badge illustrated herewith is worn by members of the American Association of Textile Chemists and Colorists.



The three "rings" are enameled in red, yellow and blue, respectively, and the initials and border are brought out in gold. The general effect is exceedingly attractive.

Badges may be secured at $1.50 each by addressing the Secretary.

A. NEWTON GRAVES,
Franklin Process Co.,
Providence, R. I.

AMERICAN DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

LOUIS A. OLNEY
Professor of Chemistry and Dyeing, Lowell Textile Institute
Directing Editor

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Volume XXI February 15, 1932 No. 4

REDUCING EXPENSES

INCREASED taxation results from one of two causes: reduced receipts causing a deficit, or increased expenditures. When a tax increase is proposed taxpayers are prompted to ask the question "Why?" The President's budget for 1933 calls for increased taxation. The reasons given are that the actual receipts for the fiscal year ending June 30, 1932, will be considerably lower than the originally estimated receipts, thus creating a deficit and instead of realizing receipts of $3,956,000,000 it is now expected that they will fall below this amount by $1,717,000,000. In the President's message transmitting the budget the principle elements cited as entering into this decline are: income tax receipts, $1,140,000,000; customs receipts, $202,000,000; miscellaneuos internal-revenue receipts, $132,000,000; and postponement of payments of principal and interest on the foreign debt, $247,000,000. Expenditures are also expected to increase over the original estimates by $437,000,000. The principal increases listed in the message are: added benefits to veterans, $135,000,000; speeding up of public works to aid employment, $160,000,000; Federal Farm Board revolving loan fund $80,000,000; interest on the public debt $24,000,000; and settlement under the War Claims Act, $37,000,000. Reductions of expenses elsewhere, supplemented by decreases in public debt expenditures on account of the moratorium and smaller tax refunds than were originally estimated, serve to offset the total of increases. These changes in receipts and expenditures indicate a deficit of $2,123,000,000 which include statutory debt retirement or a probable net debt increase of $1,711,000,000.

The present deficit and future costs of governmental operations must be met. There are two ways of raising the extra needed money—by increased taxation or by decreased expenditures. Taxation at any time is unpopular and increased taxation at the present time would be doubly so. Neither the public confidence nor the stability of the Federal Government can be maintained without balancing the budget. The welfare of the country at large demands that the financial integrity of the country be maintained. To rebuild prosperity necessitates such a course. If then, increased taxation will prove unpopular and expenses must be met, the only course left is to cut down certain expenditures so that instead of an increase in taxation the present rate may be maintained.

In looking over the budget statement for 1931, we note the following items: Under the heading "Executive Offices and Establishments", we find "Other independent bureaus and commissions and adjustments"—$9,996,656.64. Under the Department of Agriculture are included the following expenditures: Office information (editorial and distribution work), $1,351,857.31; Extension service, $10,360,578.69; Bureau of Animal Industry, $15,433,500.36; Forest Service, $25,527,165.08; Bureau of Chemistry and Soils, $1,825,004.58; Bureau of Entomology, $2,622,348.09; and so on. Each Department has innumerable bureaus. Some of them are necessary and valuable. But many of them could be combined and some of them could be abolished entirely, and business would not suffer. Government activities should be confined to those which are absolutely essential and abolish unnecessary departments, offices, and bureaus. In the estimate of expenses for the 1933 fiscal year, appropriations for the various bureaus have been reduced. But they could be reduced to nothing if certain of the bureaus were combined and others abolished.

It is interesting and surprising to note the increases in the expenditures of the past few years. In 1921 the cost of the National Parks was $1,099,117 and for 1931 the cost was $9,142,608. The budget for the fiscal year 1933 includes $9,277,020 for the National Service. This certainly could be cut down without the Nation suffering. If necessary the parks could be closed until business conditions are improved. The cost of operating the Bureau of Foreign and Domestic Commerce for 1921 was $850,577 and for 1931 it was $4,977,361 which touched a peak for this bureau.* For the 1933 budget the appropriation for this Bureau calls for $4,986,531. And yet in the face of this increase, our volume of commerce has decreased. The cost of operating the Bureau of Imigration for 1931 was $9,270,286. In 1921 it was $4,348,302. There was a decrease for 1922, but thereafter the amount of the expenditures for this department has been increasing. Immigration has been greatly restricted—why should it cost more to operate the Bureau of Immigration now than it did in 1921? The appropriation for this bureau for the fiscal year of 1933 amounts to $10,707,030 and for 1932 the budget appropriation called for $10,934,160. Since 1924 the building of warships has been reduced but the annual cost of naval engineering has increased from $11,190,000 to $18,373,000, and the cost of operating navy

*Figures are not yet available on actual expenses for the fiscal year 1932.

yards and docks from $5,070,000 to $12,860,000. In the same period of years imports have greatly declined but the cost of collecting customs has risen from $11,000,000 to $23,000,000. In 1924 $27,000,000 was spent on harbor and river improvements and for 1931 the cost had increased to $60,000,000. Such work could be delayed.

Such figures as those given above illustrate how the cost of government has increased during the past several years. It is time that unnecessary bureaus and departments were abolished and the operating expenses reduced accordingly. The existence of many bureaus are unknown to most people and the groups which they serve are very small in comparison with their costs.

Special Courses in Textile Research for Textile Executives, Research Directors and Others

The Massachusetts Institute of Technology is offering to the Textile Industry the following course of intensive study with reference to laboratory methods and research in fabrics, yarns, and fibers. The Institute has authorized the formation of a special class in this line of work under an intensive program upon Friday and Saturday of each week. The sessions will be held on Friday from 9 a.m. to 5 p.m., and from 6 to 9 p.m.; on Saturday from 9 a.m. to 5 p.m.

The work will be divided into three types of instruction. First, there will be two lectures each Friday and each Saturday; second, definite assignments of laboratory work will be made; and third, conference hours will be appointed where the results of the laboratory work will be formulated and brought to a definite conclusion.

The tuition for this special class is $50 for the six-weeks period, payable to H. S. Ford, Bursar. The total number of students in this group will be limited strictly to twenty.

If further information regarding this course is desired, communicate either with Dr. J. L. Tryon, Director of Admissions, or with the Textile Laboratory Staff. Registration for this work will close March 1, 1932, and the sessions of the class will begin on Friday, March 4, 1932.

S.O.C.M.A. Meeting

The first general meeting of this association was held at the Princeton Club of New York on Thursday, January 21, 1932, President Merz presiding.

The secretary put before the meeting a summary of various bills which have been offered so far in the Senate and the House of Representatives of the 72nd Congress in which the members were interested to any degree.

Prof. Louis A. Olney of the Lowell Textile Institute, a guest at the meeting addressed the group briefly on the work of the Research Committee of the American Association of Textile Chemists and Colorists.

It was voted to send a letter to the tariff commission protesting the discontinuance of the Census of Dyes and other Synthetic Organic Chemicals and urging the resumption of its preparation and publication.

New Dyes

Amacid Brilliant Blue 3B—a new dyestuff for wool dyeing, recently produced by the American Aniline Products, Inc. is said to be especially adapted for producing the present spring shades of Lapis, Regatta, Glass, Nassau, Olympic and Deauville.

Amacid Brilliant Blue 3B—is claimed to be especially useful for ladies dress goods and coatings for neutral and heavy shades, but has been found successful in this trade in conjunction with Amacid Brilliant 5B, Amacid Fast Light Yellow G and Amacid Fast Orange LW.

The heavy brown tones are said to be aided considerably by using the neutral dyeing Amacid Milling Brown R Supra.

Change of Address

The New York office of the American Aniline Products Co. is now located at 50 Union Square and the new telephone number is STuyvesant 9-7600.

Color Correlation Chart

The Color Correlation Chart for spring and summer 1932 has just been issued to members of the Textile Color Card Association, it was announced recently by Margaret Hayden Rorke, managing director.

In this chart, which will serve as a color guide in coordinating apparel and accessories, the fashionable shades for town, sports and evening costumes are listed according to their cast and for each group are given the correct colors for shoes, bags, hosiery and gloves.

The fashion highlights in color harmonies and contrasts, including bi-color and tri-color effects, are indicated in another division of the chart, which is to be used in conjunction with the 1932 spring season cards for silks, woolens, shoe and leather and hosiery issued by the Textile Color Card Association.

The chart will not only serve as a merchandising reference for retailers to indicate the outstanding shades for accessories, but it will also provide a guide for manufacturers in keying their production to the basic costume colors for the coming spring and summer.

Elections

At a meeting of the Board of Directors of the Carbide and Carbon Chemicals Corp. on January 14, 1932, Dr. J. G. Davidson was elected Vice-President and W. F. Reich, Jr. was appointed General Sales Manager.

New Pattern Card

A new pattern card has just been issued by the Carbic Color & Chemical Co., Inc., illustrating "Indigosol Shades on Worsted Yarn." Copies may be had by writing the company.

Determination of Substantivities of Dyes*

By **W. P. and E. R. COHOE**

39 Broadway, New York, N. Y.

This Paper describes a general method for obtaining the adsorption curve of any dyestuff on any fiber. Results have been procured by using the skin-friction machine to obtain a set of dyeings made at known concentrations. A long tapering dyeing is then made under constant conditions, except that the dye is gradually exhausted. A comparison is made of the two sets of dyeings on the General Electric recording spectrophotometer. An integration leads to a final curve which, for its characteristic portion, is a straight line on log paper. Varying conditions of temperature, mercerization, speed, tightness of twist, and the like throw the curve either up or down but do not change its angle.

THE term substantivity, introduced originally by Bancroft in 1794 to distinguish a class of dyes, has gradually come to describe the attraction which exists between a dye in solution and a fiber it colors. This attraction does not appear to be similar to chemical affinity, but on the contrary, in recent years dyeing has been classed as an adsorption phenomenon. Later in this paper it will be seen that the form of the curves obtained confirms this point of view. It is well known that for a particular class of fiber some dyes exhibit a greater affinity than do certain others. For instance, in dyeing the vats Jade Green and Yellow Green together by the exhaustion method in a beaker, the latter color does not attach itself to the fiber to any great extent until the Jade Green is largely exhaused from the solution. Rough approximations of relative attraction, in the case of dyes coloring cellulose, may be made by placing drops of solutions upon filter paper. In such cases, the dyed circle so produced is small where the attraction is great, and vice versa, whereas the water ring surrounding the dyed circle is correspondingly wide or narrow.

To obtain data relative to the speed of adsorption, it is possible, by dyeing a series of pieces successively in the same dye bath each for the same fixed period of time, to obtain an idea of the adsorption characteristics of a dye.

With the advent of synthetic fibers, this divergence in speed of application became so magnified as to lead Whittaker[3] to classify colors according to substantivity, giving to each a number designed to express its relative speed of attachment. Thus these dyes, having the same numbers, attach themselves to fibers at similar speeds.

Although each of the above methods affords a means of classifying dyes in accordance with their substantivities, it does not appear that a sufficiently accurate general method is so provided as to lead to a broad understanding of the adsorption phenomena of dyes. At the present time it is generally thought that very finely dispersed particles act in solution as if they were molecule. If this is the case, we should accordingly expect the adsorption characteristics of a dye solution to vary in accordance with concentration. A reliable general method must take this last circumstance into consideration, because the attraction between a certain fiber and a dye in solution at one concentration is not necessarily the same at a different concentration. The method to be described is designed to cover the range of concentrations, which may be designated as the range of true solution.

In exhaustion dyeing, where an end point or at least an equilibrium may be reached, adsorption data are highly desirable and useful. In continuous machine dyeing such data become a necessity. Here an equilibrium is never reached. White cloth is continuously entering the dye bath and dyed cloth is continuously leaving it. If the constitution of the dye bath changes, the shade so produced also changes. To prevent such changes, amounts of dyes equal to those removed by the cloth must be continuously fed into the dye bath in order to maintain a constant concentration.

The continuous application of sulphur colors to cotton cloth has been carried on successfully in this country for a number of years. In this case, the formulas of the make-up solutions have been worked out empirically. Because of the inferior tinctorial value of this class of colors, together with a low substantivity, the problem here is unusually simple. Direct dyes, vats, and acid colors present an increasing order of substantivity. As a result of studies upon the continuous application of these colors to various fibers, the desirability of reliable adsorption data became apparent, and a general method for obtaining them has been worked out.

This method consists in determining and comparing the weights of various dyes which attach themselves to woven fibers in a unit period of time under control conditions. It is apparent that the mere immersion of a sample in a dye solution is not likely to yield satisfactory or accurate

*Presented before the Division of Dye Chemistry at the 82nd Meeting of the American Chemical Society, Buffalo, N. Y., August 31 to September 4, 1931. Reprinted from Jan. 15, 1932, Analytical Edition of Ind. & Eng. Chem.

results. By keeping the immersed sample in motion better results are obtained. This method, which is more rapid in operation and uniform in result, consists in producing an active and uniform circulation of the dye solution through the sample. Determinations of the amounts of dye adsorbed in a unit period of time are made by the spectrophotometer.

Laboratory Machine Used

Any systematic attempt to arrive at a general method for determining the adsorption characteristics of dyes, requires, in the first place, an accurate and consistent means of applying dyes to the desired fiber at any practical concentration. In the second place, there must be available a reliable means of accurately measuring the amount of color adsorbed in the dyeing operation. The absence of such convenient instrumental means has hitherto retarded, on the one hand, a systematic study of adsorption data as applied to dyes, and, on the other, has prevented the art of dyeing from becoming truly scientific.

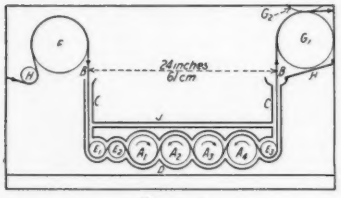

Figure 1
Cross section of Model E laboratory machine

As a means of dyeing standard cloth in any desired concentration of dye solution, a regular laboratory commercial model of the skin-friction machine (Figure 1), devised by one of the authors, has been used. As this machine has been described elsewhere[2], only a brief explanation of the principle involved in its use is necessary here. It is well known that when a submerged or partially submerged solid is moved through a liquid, there is set up in the liquid a corresponding current which follows the travel of the solid. Such motion of the liquid is called a skin-friction current. In the adaptation of this principle to dyeing, the solid takes the form of a number of driven cylinders submerged in a solution of the dye, and the cloth to be dyed passes under and over successive rolls, as shown in Figure 1. When the rolls are revolved, a portion of the dye solution follows them in the form of a skin-friction current. This current travels at high speed and possesses corresponding kinetic energy. Where it meets the cloth, partially laping the roll, it tends to carry on through the cloth, so that the total effect is like a series of pumps driving the dye solution continuously through the cloth and between the fibers. The whole virtue of the arrangement consists in the positive circulation of dye solution through the fabric many times during the period of contact. In this respect it differs from most other dyeing machines which merely involve the pulling of cloth through dye solutions.

This laboratory model has all the dimensions of full-scale operation except width. By the use of it, dyeings on narrow strips of cloth, usually 2.5 or 3 inches (6.35 or 7.62 cm.) in width, may be made at concentrations which may be varied from the lowest likely to be used in practice up to the limits of solubility. Temperatures may be maintained at any desired point up to the boiling point of water. The strips to be dyed pass through the machine at the rate of 60 yards (54.8 meters) per minute, so that the period of contact between a given part of the strip and the dye solution is slightly in excess of 1 second. The volume capacity of the machine is 3500 cc. The driven rolls are 3.25 inches (8.25 cm.) in diameter, and revolve at a speed of 1740 revolutions per minute.

Measurements of the color value of dyeings produced by the above means have been made on the General Electric recording color analyzer, devised and described by Hardy[1]. Readings of samples have been made by the laboratory staff of Messrs. Cheney Brothers, South Manchester, Conn. Of course, other methods of making these color measurements are now available. The convenience of a recording instrument has facilitated the work greatly and the accuracy of the readings has proved to be sufficient for the purposes of the investigation.

Procedure in Detail

The successive steps in this method are as follows:

1. The making of a series of dyeings in which the concentration of the dye bath is known.
2. The making of a successive series of dyeings of decreasing intensity in such a way that the amount of dye adsorbed by a known weight of cloth is known.
3. Determination of the total light adsorbed by each member of the above two series.
4. Calculation of plotting of the data obtained in the previous three steps.

Known-Concentration Series. The first step to obtain data on any chosen dye consists in making on strips of standard cloth a series of short dyeings through the machine in which is placed a series of dye solutions of known concentration. Temperature, roll speed, cloth speed, cloth tension, and chemical concentration are held constant for the entire series. Owing to the fact that between the weight of dye attached to the cloth and the color intensity thereby produced their exists a logarithmic ratio, the following percentages of dye are usually employed in the solution: 4, 2, 1, 0.5, 0.25, 0.125, 0.0625, 0.03125. Such a series exhibits all ranges of depth usually seen in commercial practice and varies from a very slight tint to a heavy shade. During the passage of the cloth through the machine, the skin-friction currents generated by the driven rolls are continuously circulating between the fibers. So effective is this circulation in the typical case that it leaves upon the cloth a higher percentage of dye than was present in the solution through which it passed.

At this stage we are in a position, after color measurement, to plot a dyeing curve through the range of the above concentrations, if the dyeings made as above can be compared with a series of dyeings wherein definitely known weights of dye are attached to the fiber. Such a curve will show known weights of dye adsorbed on one axis and the corresponding concentration of solution used on the other. Unfortunately, pot dyeing, except in specific cases, is too inaccurate for use as a general method.

Known-Weight Series. Comparing the adsorption rate

of two dyes by dyeing a long strip through a solution of each of the dyes, thus exhausting them while maintaining a constant volume, it is evident that exhaustion will take place more quickly in the case of the more substantive dye. Consequently, the lengths—or weights—of the strips so dyed in obtaining exhaustion will afford a measure of relative substantivity or adsorption rate.

This principle is used in the preparation of the known-weight series. The procedure is to make a long dyeing which passes in intensity of shade through all percentages of the known-concentration series. As it is made, this dyeing changes by infinite variation from the strongest to the weakest member of the known-concentration series. A solution corresponding to the highest concentration of the above series is put into the machine. A constant volume is maintained by using a Mariotte bottle containing water and proper proportions of caustic soda and sodium hydrosulphite in the case of vat colors, but containing no dye. Temperature, speed, and all other conditions are constant. As the cloth passes through the solution, adsorption deprives the solution of dye, and consequently the dyeing so produced becomes weaker and weaker until finally the cloth passing through the machine is only slightly tinted.

Subsequent to customary after-treatment, the long strip so produced is sampled by taking out a strip at the entering end and thereafter at successive 500-gram lengths. The set of samples thus taken is called the known-weight series.

By referring the members of the series so produced colorimetrically with the known-concentration series we have a possible method of arriving at the rate of adsorption, since by a colorimetric comparison we arrive at an idea concerning the weights—or lengths—of cloth upon which a definite weight of dye was adsorbed in a definite time.

Color Records. Each series is now ready for the color analyzer. The procedure followed is to record each series

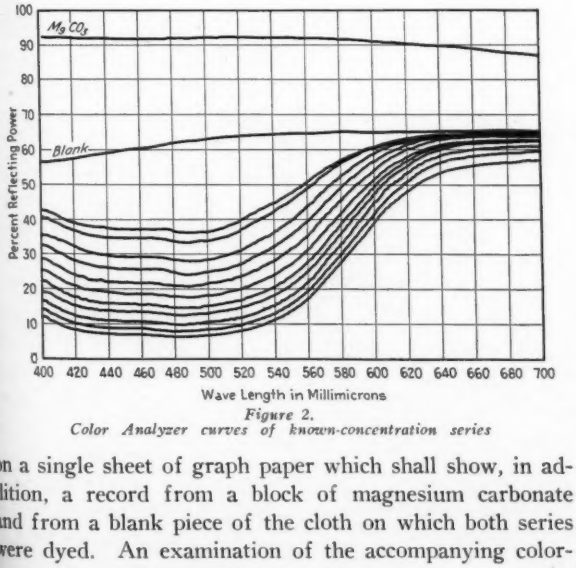

Figure 2.
Color Analyzer curves of known-concentration series

on a single sheet of graph paper which shall show, in addition, a record from a block of magnesium carbonate and from a blank piece of the cloth on which both series were dyed. An examination of the accompanying color-

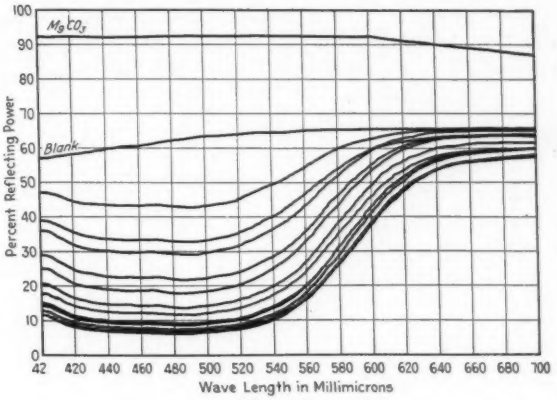

Figure 3.
Color analyzer curves of known-weight

analyzer curves, Figures 2 and 3, makes it clear that there is a significant and expected parallelism between the different members of a series. Any deviation is at once apparent and may be checked and repeated. Errors in manipulation are fortunately easy to detect at this stage or later.

Plotting of Series. For purposes of estimation, it is apparent that the needed data shall include all color values in the visible spectrum. Referring to Figure 4, the curve *AB*, recording the light reflected from a plane surface of

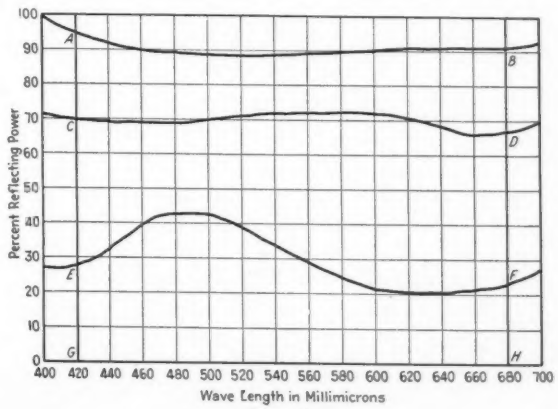

Figure 4.
Simple color-analyzer curve

magnesium carbonate, represents for our purpose 100 per cent reflection and is the standard. The line *CD* records the light reflected from the undyed cloth in the blanks, and the line *EF* records the light reflected from the dyed sample. In the calculations the light reflected between Å400 and Å420 and between Å680 and Å700 has been discarded. It therefore follows:

Area *AGHB* = light reflected from magnesium carbonate

Area *CGHD* = light reflected from blank

Area *EGHF* = light reflected from sample

Area *AGHB* — area *CGHD* = adsorption of light by blank

Area *CGHD* — area *EGHF* = adsorption of light caused by dye applied to blank, which is area *CEFD*.

To find the percentage of light adsorbed by a sample, the area under the sample is subtracted from the area under the blank and divided by the area under the magnesium carbonate thus:

$$100 \times \frac{\text{area } CGHD - \text{area } EGHF}{\text{area } AGHB} = \text{percentage absorption.}$$

The color-analyzer curves for each of the two series (Figures 2 and 3) are thus measured and the percentage of light absorption of each sample recorded in tabular form. From these data two curves are now plotted.

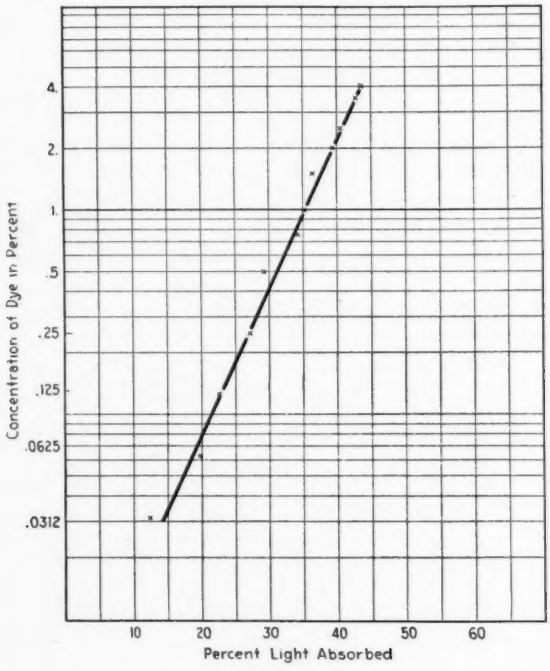

Figure 5.
Curve I

Figure 5 (Curve I) illustrates the type of curve obtained by plotting the data of the known-concentrations series, where the y axis denotes the concentration of the dye solution in per cent, and the x axis the per cent light absorption as recorded.

Similarly, in Figure 6 (Curve II), for the known-weight series we have weights of cloth run out plotted against the percentage of light absorption of the samples. When a particular dye is applied to the same cloth under the same conditions, it is reasonable to conclude that identical color effects must be produced by identical weights of adsorbed dye. We are, therefore, in a position to know from the data of Curve I how much dye was adsorbed by a weight of cloth between any two points on Curve II by referring to the common standard of light adsorption. It is more convenient, however, to plot a new curve (Figure 7, Curve III) which shows on the y axis percentage concentration of dye solution, and on the x axis the weight of cloth run out in grams.

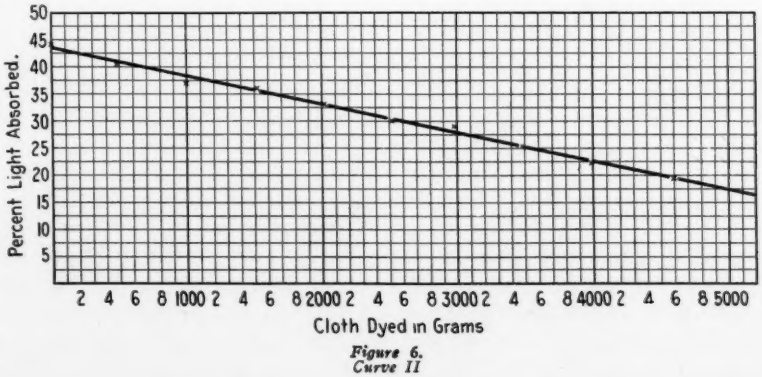

Figure 6.
Curve II

It is at once apparent that from Curve III may be derived some real quantitative information. For instance, on any part of the curve the drop in concentration which took place while 100 grams of cloth were dyed and, therefore, the weight of dye absorbed by that 100 grams of cloth, may be found. To do this it is necessary to proceed by a series of infinitesimals. Referring to Curve III, if the assumed points y_4 and y_3 are taken, and the corresponding points x_4 and x_3 cut off on the x axis,

$$\Delta y = y_4 - y_3, \text{ and } \Delta x = x_3 - x_4$$

while Δy = percentage of dye in the bath used on Δx grams of cloth. As the volume of the bath is 3500 *cc.*, $\Delta y \times 3500$ = grams of dye used on Δx grams of cloth. Therefore,

$$\frac{\Delta y \times 3500}{\Delta x} = \text{average weight of dye used on 1 gram of cloth}$$

for interval $x_3 - x_4$ and so for any other part of the curve.

Transferring a series of these results to a new curve (Figure 8) where the y axis is the weight of dye on 1 gram of cloth and the x axis the weight of the cloth dyed, the rectangle $PQRS$ represents the weight of dye used on $(R - Q) = \Delta x$ grams of cloth. In this way a series of small rectangles may be made which represent the actual dye used on the cloth run out. If the top of these rectangles is divided in half at the points C, D, and E, and joined by a curve, then the area under the curve AB represents the amount of dye applied to Δx grams of cloth run out, for, as the curve AB is short, it is to all intents a straight line, and as the triangle APC is equal to the triangle CSB, the area under the curve AB is equal to the area of the rectangle $PQRS$.

The values obtained for a large number of middle points, when tabulated, enable us to plot Curve IV (Figure 9), wherein on the x axis is given the concentration of the dye solution in per cent, whereas on the y axis is given the percentage weights of dyes which will be absorbed on cloth when dyed under the conditions present when the two known series were dyed. These conditions are usually arranged so as to pro-

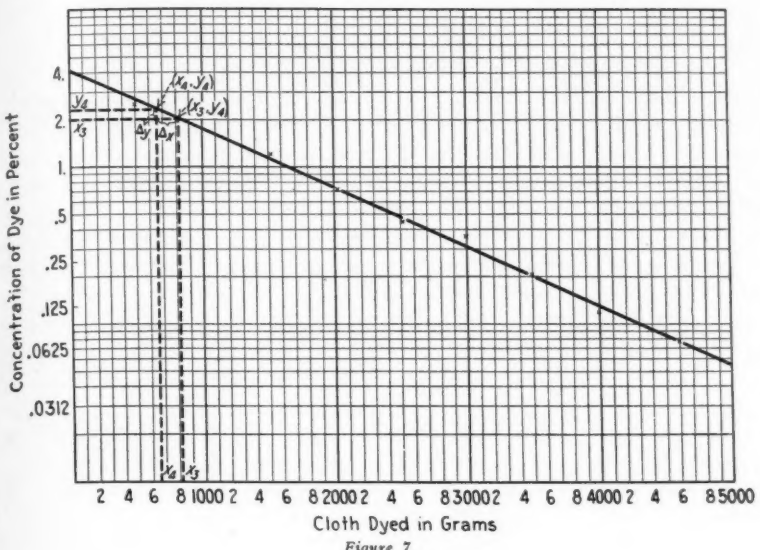

Figure 7.
Curve III

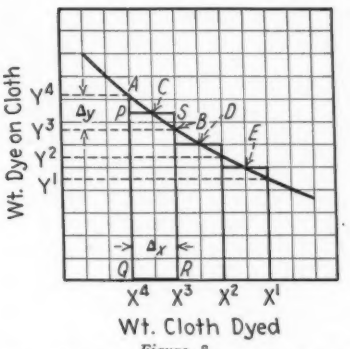

Figure 8.
Small section of curve replotted from Curve III

vide usual and average workability for the dyes of the class into which each comes. It will be understood that these conditions for direct colors, for instance, would vary from those to be employed in the cast of vats or acid colors.

Use of Data

In practice, the curves serve a necessary purpose. When a sample is matched on the laboratory machine, the percentage of each dye present is known. Reference to the curve of each dye tells at once how much dye must be fed into the machine to compensate for that taken out by the cloth, and a dye bath is made up accordingly. Conversely, it is known what dyes and how much of them were used to produce the shade exhibited by a particular sample, reference to the curves will give the needed percentage of those same dyes to be used in the starting bath. The feed in this case will be the amount of dyes which have been found necessary to produce the shade on the sample.

In exhaustion dyeing a study of these curves proves of practical utility, because it is evident that dyes whose curves have a like or nearly like locus will exhaust at an equal or nearly equal rate, as the case may be. Such dyes give the best working conditions when used together. Even when the curves of dyes differ widely, they sometimes cross each other. In this case it is apparent that if dyeing conditions are adapted to correspond to this point of crossing, the dyes will work together well.

Curves as Expression of Properties

The form which Curve IV exhibits makes it apparent at once that no chemical action is indicated between the dye and the fiber constituting the cloth. The equation for a curve of this locus is

$$y = cx^n$$

where y = percentage of dye adsorbed
x = percentage of dye in solution
n = tangent curve made with horizontal axis
c = variables

The common variables are time, temperature, roll speed, hydration (mercerization,) tightness of twist and weave and hydrogen-ion concentration.

So far as observations extend, the angle of the curve, expressed by the exponent n, represents the essential characteristics of an individual dye, and this angle is not changed by the variable. This is only true, however, in so far as it represents the adsorption characteristics of a dye for a single class of fiber. Up to date there has been little opportunity to prepare curves of the same dye for different fibers.

Although the variables do not appear to influence the value of the exponent n, they do, of course, change the position of the curve, throwing it either up or down. Thus an increase in time, temperature, or roll speed elevates the curve, whereas an increase in tightness of twist or weave depresses it.

By reference to the curves on Figure 9, it will be seen

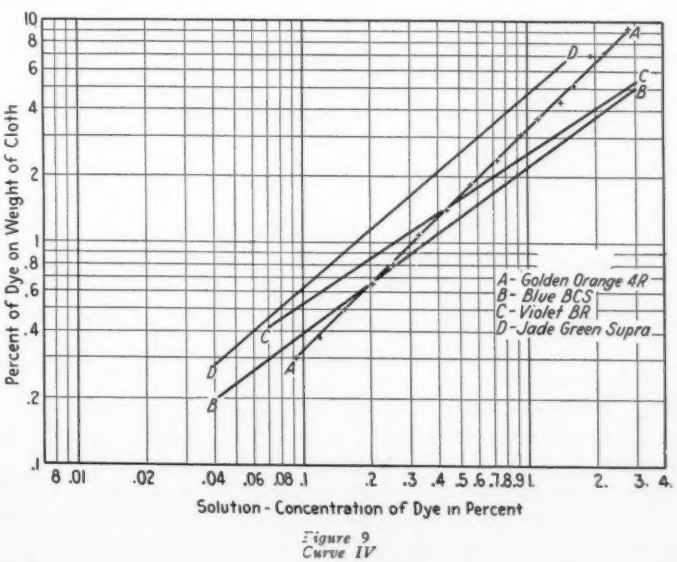

Figure 9
Curve IV

that A for Golden Orange 4R makes a 45-degree angle with the base. In this case the exponent in the equation, $y = cx^n$, becomes unity and the curve would be a straight line if plotted on ordinary coordinate paper. It would appear, therefore, that in such case the adsorption varies lineally with the concentration. In other cases illustrated (Figure 9, *B. C.* and *D*), the angle made is less than 45 degrees and as a consequence the adsorption is no longer a lineal function of the concentration. Although the extreme ends of these curves have not been studied intensively, it seems probable that at either end the curve tends to become parallel with the base. All these observations suggest a number of questions which can be answered only after further studies have been made.

Of the many questions which arise, the following may be chosen:

1. When the angle of the curve is 45 degrees, do we have a perfect solution in which the adsorption (for a particular fiber) becomes a function of the number of molecules present or of the number of particles present so finely dispersed as to behave like molecules?

2. When the angle of the curve is less than 45 degrees, do we have a case of imperfect dispersion, and if so, is adsorption a direct function of the proportion of finely dispersed particles actually present in a solution of given concentration?

3. How is the locus of an adsorption curve determined by the molecular weight and structure of the solute?

It is evident that in the course of this work there has been accumulated considerable data expressing definitely the relationship between color value and weight of adsorbed dye producing it. Once this relationship in a group of colors has been determined, the next logical step is to determine the final color value produced when definite weights of two or more of the group are dyed upon the same fibers. This interesting question will be the subject of a future paper.

ACKNOWLEDGMENT

It gives the authors much pleasure to record their gratitude to Cheney Brothers for valuable assistance in reading samples of color measurements.

LITERATURE CITED

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[2]Melliand, C. E., Vol. I, pp. 9-1385. U. S. Patents 1,612.698; 1,737,149; 1,803,644.

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NEW PATENTS

(*Abstracted by Synthetic Organic Chemical Mfrs. Assn.*)

Azodyestuffs Insoluble in Water and Process of Making Same. (Obtained by combining any diazo, tetrazo or diazoazo compound not containing sulfonic or carboxylic groups with a 2.(2'-hydroxy-3'-naphthoyl-amino)-5-halogen-1.4-dimethoxy-benzene, yielding shades of bluish red, red, brownish red, blackish blue, etc., of good fastness to light and bucking.) Leopold Laska and Arthur Zitscher, of Offenbach-on-the-Main, Ger., assignors to General Aniline Wks., Inc., of N. Y., N. Y., No. 1,838,229, December 29, 1931.

Vat Dyestuffs of the Pyrazolanthrone Series. (Comprise condensing a pyrazolanthrone with an 1-aminoanthraquinone by means of an alkaline condensing agent and acting on the condensation product with a halogenating agent, yielding blue violet shades.) Paul Nawiasky and Emil Krauch, of Ludwigshafen-on-the-Rhine, Ger., assignors to General Aniline Wks., Inc., of N. Y., N. Y., No. 1,838,232, December 29, 1931.

Fast Azodyestuffs and Process of Making Same. (Comprise tetrazotizing a diamino-diphenyl-cyclohexane compound and combining the tetrazo-compound thus formed first with a naphthol-sulfonic acid and then with a second combining component which may be identical with the first one; dye animal fibers different shades of excellent fastness especially to washing, milling and perspiration.) Rudolf Schule, of Frankfort-on-the-Main, and Ernest Korten, of Frankfort-on-the-Main-Fechenheim, Ger., assignors to General Aniline Wks., Inc., of N. Y., N. Y., No. 1,838,235, December 29, 1931.

Azo Dyestuffs Containing Chromium. (Produced from 1.3-phenylene-diamin 5-sulfonic acids coupled with diazo-compounds of o-amino-phenols and treating the product thus obtained with agents supplying chromium, yielding fast brown dyeings on wool and leather.) Hans Krzikalla, of Mainheim, and Franz Blummel, of Seckenheim, Ger., assignors to General Aniline Wks., Inc., of N. Y., N. Y., No. 1,838,267, December 29, 1931.

Azo Dyestuffs from 2.3-Hydroxynaphthoic Acid Arylids and Process of Making the Same. (Yield reddish shades of excellent fastness to kier boiling.) Leopold Laska and Arthur Zitscher, of Offenbach-on-the-Main, Ger., assignors to General Aniline Wks., Inc., of N. Y., N. Y., No. 1,838,270, December 29, 1931.

Production of Anthraquinone Derivatives. (Intermediates and dyestuffs for cellulose acetate silk, consisting in the nitration of 1-phthalimidoanthraquinone and the hydrolysis of the nitrated body and subsequent reduction of the hydrolyzed body, whereby dyes or dye intermediates can be obtained which may, for instance, be acylated, for example, by benzoylation.) Ernest George Beckett and John Thomas, of Carlisle, England, assignors to Scottish Dyes, Ltd., of Carlisle, England, No. 1,838,523, December 29, 1931.

Production of Black Vat Dyestuffs of the Anthracene Series. (Consists in treating dibenzanthrone dissolved in sulphuric acid with an alkali metal dichromate.) Cecil Shaw, of Deighton, Huddersfield, England, assignor to L. B. Holliday & Co., Ltd., of Deighton, Huddersfield, England, No. 1,839,271, January 5, 1932.

Manufacture of Artificial Silk. (Comprises mixing wood pulp with a minor proportion of cotton dust, and subjecting said mixture to a solution of caustic soda.) William F. Richter, of Oppollo, Pa., assignor to Chemical Holding Corp., of Oppollo, Pa., No. 1,839,411, January 5, 1932.

Making of Soda Cellulose for Conversion into Viscose. (Relates to aged soda cellulose capable of being directly and substantially completely xanthated, the cellulose base

(Continued on next page)

Rapid Methods for Detecting 'Damage' in Cotton and Wool

(Continued from page 106)

when the greatest precautions are taken to wash out residual alkali or acid from the wools before testing with Benzopurpurine 10 B. It is obvious that the overall staining produced as a result of alkali treatment can be distinguished from the partial staining (in the damaged parts) of wool damaged by acids or by mechanical means. Furthermore, the staining effect can be more readily observed in ultra-violet light.

It is thus evident that in the Pauly test as modified by Rimington, and the Sieber test, wool technologists have to hand two useful methods for rapidly ascertaining the extent of damage in raw and processed wool materials.

In connection with a damaged cotton fiber it must be remembered that the cuticle exerts a restraining influence on the behavior of the cellulose which it encloses. This is particularly evident in processes in which a cotton fiber is subjected to swelling forces. Thus if cotton is immersed in caustic soda of mercerizing concentration the cuticle appears to restrict the swelling of the inner cellulose so that if the cuticle is punctured in any way this inner cellulose extrudes through the puncture. There is thus good reason to believe that the detection of damage to the cuticle of a cotton fiber can be effected by making use of this restraining influence of the cuticle in a swelling process.

Several years ago Fleming and Thaysen (Biochem. Journ., 1920, *14*, 25, and 1921, *15*, 407) discovered that damage in cotton could be conveniently detected by microscopical observation of the swelling phenomena which resulted from treatment of the cotton fibers with caustic soda and carbon bisulphide. In this treatment partial formation of cellulose xanthogenate occurs accompanied by a high degree of swelling.

In the test the cotton fibers are treated with a mixture of equal parts of 15 per cent caustic soda and carbon disulphide and allowed to stand in contact with this mixture for up to one hour. During this period each fiber swells and after about half an hour the swelling is sufficient to burst the cuticle. In this process the cuticle of an undamaged fiber appears to be weakest along spiral lines so that the fiber gradually assumes a twisted cord appearance. On the other hand, if the cuticle is damaged at any point then the swelling there is not restricted and a bead of cellulose is formed which after a time dissolves in the surrounding liquor. The amount of damage and distribution in a cotton fiber may thus be ascertained by microscopical examination of the cotton fibers during the swelling process.

It has been noticed however at the Shirley Institute that if damaged cotton fibers are swollen with caustic soda and then stained with Congo Red the resulting staining is most intense at the points of damage. This observation has been developed by T. B. Bright (J. Text. Inst., 1926, *17*, 397) so that it is now possible to rapidly test for damage in cotton.

Bright's method consists of first wetting out the cotton by immersion in water contained in a filter flask and then connecting to vacuum. The cotton is then removed and squeezed free from excess of water and placed in 11 per cent caustic soda solution (11 grams of alkali per 100 grams of solution) for 5 minutes. After washing with water it is then shaken for about 6 minutes in a saturated solution (about 2 per cent) of Congo Red, removed and shaken up with successive quantities of water until color ceases to bleed out from it; the colored cotton is then placed in 18 per cent caustic soda solution and after a few minutes examined under the microscope. The damaged parts appear to be deeply stained owing to greater absorption of dye by the cellulose which has extruded at these points.

It is of course known that degradation in cotton fibers can be ascertained by the resulting diminished viscosity of their solution in cuprammonium solution, but this method is somewhat tedious and fails to detect purely mechanical damage such as is revealed by the Fleming and Thaysen, and the Bright tests.

New Patents

(Continued from preceding page)

of which consists of wool pulp having a very high alpha cellulose content.) George A. Richter, of Berlin, N. H., assignor to Brown Co., of Berlin, N. H., No. 1,839,774, January 5, 1932.

Tinting Liquid. (A tinting fluid for the identification of yarns comprising a fugitive dyestuff, a non-drying oil and a sulfonated oil.) Herbert Platt, William Whitehead, and Frederick J. Williams, of Cumberland, Md., assignors to Celanese Corp. of America, No. 1,840,290, January 5, 1932.

New Sulphur Dyestuffs and Process of Making. (Obtainable from the halogen substitution products of dinaphthylene-dioxide by sulphurization; dye cotton yellow to blackish-brown shades of excellent fastness properties.) Erwin Kramer, of Cologne-Deutz, Ludwig Zeh, of Wiesdorf-on-the-Rhine, and Bernhard Bollweg, of Leverkusen-on-the-Rhine, Germany, assignors to General Aniline Works, Inc., of New York, N. Y., No. 1,840,322, January 12, 1932.

Vat Dyestuffs of the Anthraquinone Acridone Series. (Obtainable by reacting u[illegible] an alpha-amino- or alpha-alpha-diamino-1.1'-di-anthraquinonylamine-carbazole with an ortho-halogen-anthraquinone-carboxylic acid; dye cotton from an alkaline hydrosulfite vat red to olive green shades of excellent fastness to light; also valuable dyestuffs for printing textile fibers.) Fritz Baumann, of Leverkusen-on-the-Rhine, Germany, assignor to General Aniline Works, Inc., of New York, N. Y., No. 1,840,383, January 12, 1932.

(Continued on next page)

New Patents

(Continued from preceding page)

Acid Wool Azodyestuffs. (Obtainable by coupling in acid solution a diazo compound of a monoacyl-phenylene-diamine sulfonic acid-alkylphenyl or benzyl-amide with a sulfonic acid of a *B*-naphthylamine or an N-alkyl derivative thereof; dye wool clear, even red to violet shades of good fastness to light and fulling.) Heinrich Clingestein, of Cologne-on-the-Rhine, Paul Zervas, of Cologne-Mulheim, and Hugo Schweitzer, of Leverkusen-on-the-Rhine, Germany, assignor to General Aniline Works, Inc., of New York, N. Y., No. 1,840,385, January 12, 1932.

New Basic and Acid Dyes of the Rhodamine Type. (Comprises condensing a fluorescein dihalide with para-aminophenol.) Leonard James Allchin, of Manchester, England, assignor to Imperial Chemical Industries, Ltd., of London, England, No. 1,840,553, January 12, 1932.

Purification of Diamino-Alpha-Alphá-Dihydroxy-Anthraquinone Disulphonic Acid Dyestuffs. (By treating with dilute mineral acid.) Harold T. Stowell, of Buffalo, N. Y., assignor to National Aniline & Chemical Co., of New York, N. Y., No. 1,840,644, January 12, 1932.

New Ciba Products

The Ciba Co., Inc., has lately put on the market an interesting line of chemical products, auxiliary to the textile trade.

Sapamine MS. While this is said to be a remarkably efficient wetting-out agent and emulsifier, not being affected by acids, allakies or boiling, yet its principal use is in the after-treatment of direct and acid dyeings, whereby they are claimed to be made fast to water and cross-dyeing. Slight changes in shade occur in some cases, showing that new chemical compounds are produced by the condensation which occurs. This is an original product of the Soc. Chem. Industry in Basle.

Sapamine CH. Another novelty, which acts as a wetting-out agent in very strong acid solutions, giving a foam-like soap. It is said to be particularly useful in carbonizing wool or shoddy inasmuch as it permits the acid or aluminum chloride to easily penetrate the vegetabe matter and insures complete carbonization.

Albatex WS. This material is recommended by the manufacturer for addition to the dyebath when dyeing two-fiber goods. It is said to cause the direct dyestuffs to dye almost exclusively on the cotton or rayon, leaving wool or silk almost unstained. With many dyes, sharp two-tone effects may easily be produced.

Invadine N. A wetting-out agent, unaffected by acids, alkalies, lime, alumina or salts. It is said to be particularly useful in scouring and fulling baths as it protects the soap from the action of lime in the water. In dyebaths it acts as a leveller and assists penetration and even dyeing. The manufacturers claim that it is free from all oily matters and does not interfere with the proper working of any class of dyestuff.

Migasol PC. A dispersed paraffin, which is stabilized against boiling, acids, alkalies and metallic salts. This type is especially recommended by the manufacturer to be used for imparting a silky finish to cotton and rayon goods and in giving a firm hand to wool and silk fabrics.

Migasol PJ. Similar to the PC brand, but prepared especially for making a waterproof finish in a simple padding and drying operation.

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

POSITION WANTED

Textile Chemist and Colorist with ten years' practical experience, being available, solicits inquiries. Address Box No. 710, American Dyestuff Reporter, 440 Fourth Avenue, New York, N. Y.

POSITION WANTED

Chemist-dyer, cotton all forms, rayon. All classes dyes. Fifteen years' experience. Capable of bleaching, dyeing various fibers and producing results. Location immaterial. Reasonable salary. Address Box No. 715, American Dyestuff Reporter, 440 Fourth Avenue, New York, N. Y.

POSITION WANTED

Industrial Chemist with sixteen years' practical experience dyeing and printing textiles and testing dyestuffs and finished piece goods, knit goods, etc., wishes position in plant or testing laboratory. Available immediately. Address Box No. 716, American Dyestuff Reporter, 440 Fourth Avenue, New York, N. Y.

POSITION WANTED

Experienced dyestuff salesman, also demonstrator, desires connection. Would consider taking charge of a dye-house.

Thoroughly experienced dyeing yarns, raw stock, hosiery, rayons.

Acquainted in Southern territory, also familiar with mills in Massachusetts and Rhode Island. Satisfactory references.

Address Box No. 717, American Dyestuff Reporter, 440 Fourth Avenue.

POSITION WANTED

New Bedford Textile School graduate. Wide laboratory and dyeing experience on cotton, rayon and silk fabrics. Recently Chief Chemist for large package dyeing concern handling all types of colors. Six years' experience, best references. Address Box No. 718, American Dyestuff Reporter, 440 Fourth Ave., New York City.